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Paper Making and Paper Making Machinery

The Forest Is the Principal Source of Raw Material—The Process Is Continuous from Grinding the Wood to Winding the Finished Sheet of Paper

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THOUGH paper is made by many processes and of many materials, including cotton, linen, jute, manilla, esparto, etc., by far the larger part of the commoner grades, generally referred to as "newsprint," is made from wood. The preparation of the wood fiber by grinding the billets of wood upon huge grindstones; screening, filtering, pounding, and macerating the pulp; and finally converting the resulting thin, creamy, yellow fluid into a swiftly flowing web of white paper, ready to print upon, is a process that involves a line of highly specialized machinery.

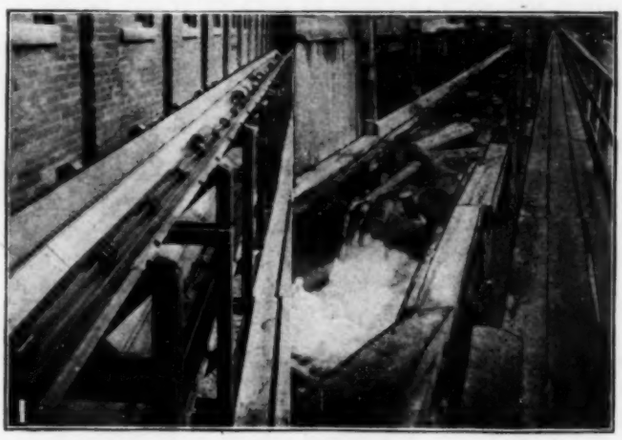


FIG. 1. PARTITIONS OF THE CONVEYORS.

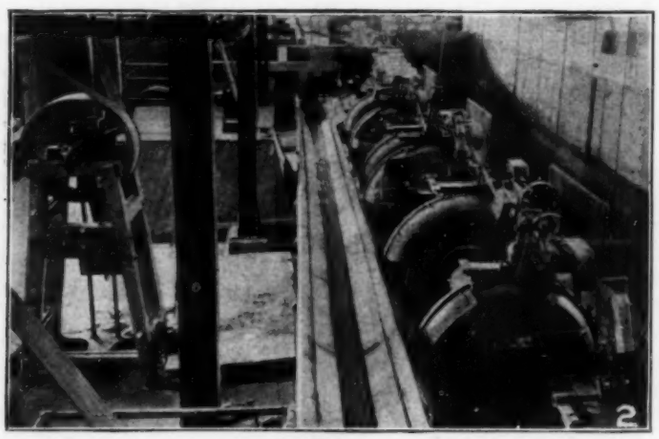


FIG. 2. THE DRY BARKING MACHINES AND CONVEYORS

Chemical and Mechanical Pulp

Paper pulp is made from wood by two distinct methods—the chemical and the mechanical. Of the chemical processes there are two that are commonly used; one in which the reagent is caustic soda while the other uses sulphurous acid; the products are known respectively as "sulphate" and "sulphite" pulp. The reactions are carried out in large iron receptacles, called "digesters," built of boiler iron and lined with brick or cement to resist the action of the acids and capable of withstanding high steam pressures for hours at a time.

In the manufacture of mechanical wood pulp the reduction to fiber is accomplished by the abrasive action of revolving grindstones to which the wood is fed by hydraulic pressure. The ground wood fiber is shorter and less pliable than that produced by chemical means, and for that reason about 20 per cent of sulphite pulp is added at certain stages in the manufacture of newsprint paper to make the product less brittle.

As the production of chemical pulp is a proposition that would be of greater interest to the chemist than to men of a mechanical turn of mind, and makes use of little machinery aside from tanks, valves, piping, etc., it will not be considered in this article beyond the references necessary to explain the presence of sulphite pulp in a ground wood mill, the nature, and the method of using it.

For the production of ground wood pulp in quantity a great deal of power is necessary and for that reason and, further, because of the fact that the stream that supplies the power will also furnish a cheap and effective means of transporting the raw material, mills for the production of ground wood pulp are almost invariably located near a fall in some large river.

Logs from the forest can thus be floated down the river to the forebay of the mill where they can be taken up by conveyors and hauled directly to the saws, barking machines and splitters that prepare them for the grindstones. The logs are first sawed to lengths of about 2 ft. and these billets are stripped of their bark, either by revolving disks into which are set sharp knives of steel, or by being passed through a "barking drum" in which they are rolled about until the bark is loosened and comes off.

The Barking Drum

The barking drum is in effect a large tumbling barrel. It may be 30 ft. long by 10 ft. or more in diameter. It has no central shaft, but is supported in a horizontal plane upon rollers located at intervals throughout its length. The walls are constructed of flat bars of iron so spaced that there is ample room between them for the escape of the comparatively thin pieces of bark but not enough to permit a round billet three or four inches in diameter to get away.

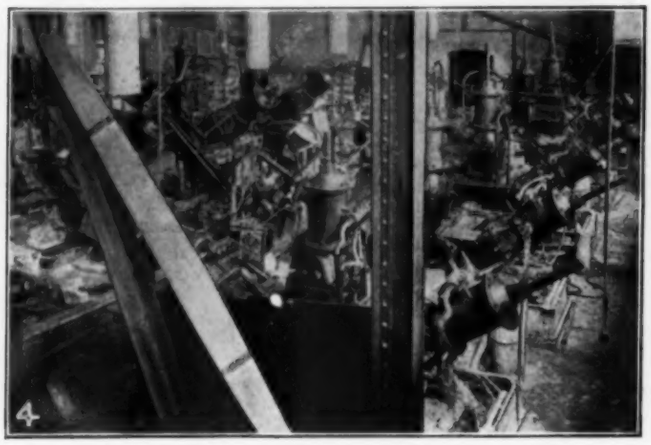
Large openings at the center of each head provide for easy loading and unloading by means of conveyors,

FIG. 3. THE BARKING MILL AND WOOD STACK

and a flood of water is poured over and into the drum as it revolves, carrying away the lighter fragments of bark and discharging the billets into the conveyor that takes them to the grinding room or to the stack.

(though with a great deal more noise) as the quietly flowing streams of water, but they possess the disadvantage of requiring power to operate them, and the cost of their maintenance is much higher. Wherever it is desired to deliver the wood a section of the trough is lifted out, allowing the billets to fall through while the chain or rope passes over the gap without difficulty. A photograph is shown in Fig. 1 of a water conveyor taken at a point where it is delivering its load to the mechanical conveyor at which place the water flows through a coarse screen and disappears to resume its burden at a lower level, leaving the billets to be carried up the incline by the rope, a section of which may be seen at the left.

Another section of mechanical conveyor of a slightly different type is shown in Fig. 2, where it conveys the billets to the dry barking machines. This department is out of service except in emergencies for the reason that all the barking is ordinarily done in the drum. The barking mill where the logs are received and put into shape for the grinding machines may be seen in Fig. 3, which also shows sections of both water and mechanical



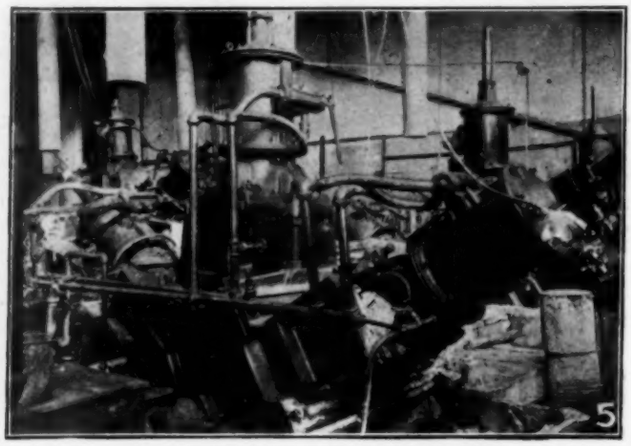


FIG. 4. A VIEW IN THE WOOD GRINDING ROOM. FIG. 5. ONE OF THE GRINDING MACHINES

The dry barking by means of the revolving disks has been practically superseded by the drum method, for, though it performs the operation very quickly, it requires close supervision and attention from the operators and is not unattended by danger from the swiftly moving and necessarily exposed knives as well as from flying chips. The drum, though slower, takes care of itself and presents no dangers.

The water conveyors are simply wooden troughs that conduct water from the forebay to various points at lower levels where the wood is to be delivered, and the inclines are so calculated that the water may travel a distance of a mile or more in accomplishing a descent of 50 ft. It constitutes an inexpensive and convenient means of transport when water is plentiful, as the billets may be dumped in anywhere and will float along without attention until they reach the switch where they are to be diverted.

The water conveyors will not carry the wood up-hill, nor is it desirable to have them enter the mill buildings where there is moving machinery; therefore they are supplemented in places by chain or wire rope conveyors. These are wooden troughs of inverted V-section, lined with iron plates and carrying at the bottom of the "V" a continuous rope or chain to which at intervals suitable dogs are attached to carry the billets.

The dry conveyors carry on with as little attention conveyors and some of the immense stacks of wood that constitute a part of the reserve supply.

From the barking mill the wood goes in ordinary course to the grinding room, which is partly shown in Fig. 4. In this picture everything appears to be in chaos, though really it is most orderly. In the mill under discussion there are five rows of grinding machines, each row connected directly to the shaft of a huge water turbine. Four of the turbines develop 2,400 hp. each and the fifth 3,500 hp. The one belt in the room drives a pump.

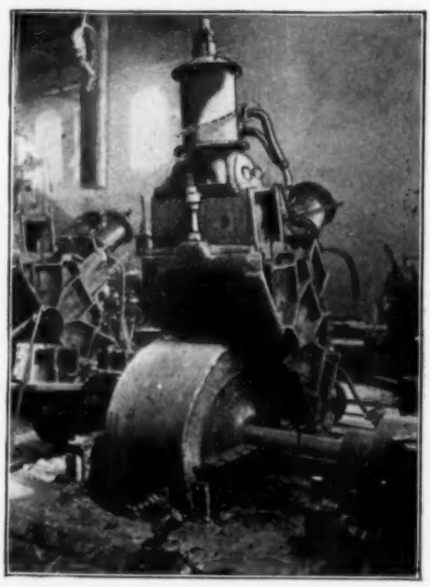


FIG. 6. GRINDING MACHINE OPEN FOR REPAIRS

No moving machinery is to be seen except the small governing machines that regulate the speed of the turbines. The revolving shafts are covered and each stone is completely enclosed. Each power line is continuous, the machines being so spaced that the shaft, or arbor, upon which a stone is mounted is connected by flange couplings directly to the shaft of the machine adjacent, and the first one in line to the flange of the water wheel shaft. An accident necessitating the stoppage of a stone puts out of business all machines in that line that are not between the damaged one and the water wheel; but accidents seldom happen.

It is a difficult matter to get a photograph in this room, so closely spaced is the machinery; and practically all the floor space not covered by the machines themselves is taken up by the little cars that convey the billets from the corner, where the mechanical conveyor delivers them to the machines. An attempt is made in Fig. 5 to show an individual machine, and in Fig. 6 is a machine with the casing swung up and out of the way for changing a stone.

These machines are what is known as the three-pocket machines; each has within its casing three rectangular chambers, or pockets, about 18 in. square, extending across the full width of the stone. Each pocket is fitted with an hydraulically operated plunger by means of which the wood is pressed against the stone.

The pockets are closed by sliding doors through which the wood is charged. Raising the plunger in any one pocket by a movement of the control valves, the operator will lift the door and stack the aperture with all the wood it will hold, the billets lying parallel to the axis of the stone. Closing the door the operator, by a reverse movement of the valves, causes the plunger to push the wood against the stone with a pressure in accordance with the diameter of the hydraulic cylinder and the water pressure. As the cylinder is 14 in. in diameter and the water pressure 60 lb. per square inch, the load from one pocket alone approaches 5 tons.

Jets of water are flowed upon the stone before each point of contact and the heat generated by the friction of the grinding raises the temperature of the liquid pulp that flows from the stone to a temperature of 170 deg. F.; which temperature is purposely maintained by regulating the flow of water.

The stones in these machines are Cleveland stones, 54 in. in diameter with 30-in. face. They are no different, except in size, from ordinary grinding stones, but they must be perfect in order to resist the pressures brought to bear upon them. The life of a stone may run from six months to two years, according to its quality. The stones turn 220 revolutions per minute, and each stone requires upward of 400 hp. to drive it.

The nature of the resultant fiber depends to a surprising extent upon the condition of the surface of the grindstones. They are turned off with a tool that is not unlike the familiar "emery-wheel dresser" of the machine shop except that instead of having a roll built up from a number of thin pieces of very hard steel the "jigger," as it is called in the mill, consists of a single roller about 3 in. in diameter by about the same dimension in length. The face of this roller is cut with a number of parallel serrations or with a double helix like a knurl, according to the character of the fiber the stone is expected to deliver.

The tool is held in the toolpost of an hydraulically-operated slide-rest that is permanently a part of each grinding machine. This slide-rest, called a "lathe" by the men who use it, is located at about floor level in the rear of the machine, within the casing, and covered by a swinging door of metal.

A stone needs to be redressed after about sixteen hours of grinding. One "jigger" (the term applies to the operator as well as to the tool) attends to the "jigging" of all the stones; and his job is no sinecure. He must be a man of experience and sound judgment as well as possessing a knowledge of pulp making.

He does not ordinarily interfere with the progress of the work. When redressing is necessary he lifts the door in the rear of the casing, sets the tool in the toolpost of the slide-rest and by manipulating the valves to direct the water first against one side of the piston and then the other he sends the tool three or four times across the face of the stone.

The operation requires only a moment or two and the grinding pressures on the stone are not released. The work is therefore done under a flood of pulp and comparatively hot water, but the "jigger" is used to that—it is a part of his job.

An operator is required for each of the grinding machines and it keeps him busy loading the pockets with wood as they become exhausted. Helpers are constantly wheeling the little cars loaded with wood to points where the operators can reach them.

The pulp is given a preliminary test at frequent intervals by the man in charge of the grinding department, who will catch some of the liquid pulp as it runs from under a stone and flow it over the bottom of a shallow tray made of blue glass. This is known as the "blue glass" test and for its results depends upon the judgment and power of observation of the individual who makes it. He will observe, perhaps with a microscope, the length and conditions of the fibers as they settle down upon the bottom of the tray, and take note of their felting quality.

The stock may be "free" or "slow," opposed terms that one is apt to hear frequently from the operators of the paper machines, and which denote qualities that affect the running of the pulp upon these machines. It is necessary to maintain a certain standard at all points in the progress of the pulp in order that there may not be constant variation in the weight or quality of the finished product or need for continual manipulation of the controls of the paper machine to prevent it.

There is a much more elaborate test conducted at regular two-hour intervals upon "stock" taken from three separate places in the system—from the grinding stones, from the beaters, and from the paper machines. These three batches are handled separately, though the tester conducts the experiment upon all of them at the same time.

A handful of stock is first placed in a small centrifugal dryer where it is allowed to run for a definite time: one, two, or three minutes for the stock taken from the different places. One ounce is then weighed out and vigorously stirred into a receptacle containing 1,000 c.c. of water. The mixture is then turned into the testing device, which returns a portion of the water and suspended fiber to a graduated glass; allows some to flow to waste; and retains the balance, with most of the pulp, in the container. The amount of fiber and water flowing into the graduated glass and the condition of the pulp in the container are factors which enter into the determination of the quality of the product.

The Training of Workers in Manufacture

III. Apprenticeship Practices Regarding Indenture, Age, Payment and Certificates —Public School Substitutes—Evening, Part-Time and Co-operative Schools

By J. V. L. MORRIS

WHERE well organized apprenticeship is practiced, the usual procedure is to execute an indenture stating the conditions of apprenticeship as to length of service, varieties of experience provided, amount of supplementary instruction, and rates of pay. While there is usually a clause relieving the corporation from full responsibility to execute all provisions, and even to suspend or totally terminate the contract should commercial conditions necessitate such action, observation of the workings of apprenticeship with and without contract leads the writer to believe that the good faith of a responsible corporation is thereby enlisted to insure the satisfactory instruction of the apprentice. It is believed also to act as a moral restraint upon the apprentice against terminating the training program under temporary dissatisfaction with some instructor, a foreman, or certain phases of the work.

The parent, both parents, or in case of their decease, the apprentice's guardian is ordinarily made a party to the contract. While modern social phenomena suggests that the influence of parental authority is much less effective during adolescence than was the case in a more primitive and stable social organization, the practice would seem to have in many cases a wholesome effect.

In the state of Wisconsin the contract is under the supervision of the State Industrial Commission. Such a disinterested authority may be highly useful in insuring the satisfactory working of the indenture plan.

It should be stated that the control of an apprentice agreement is chiefly moral and not ordinarily enforced by legal measures, as the attitude of the company is ordinarily that if an apprentice breaks his contract he is lacking in the moral qualities which they desire. On the other hand, the contract is so loosely framed that it is not enforcible by legal measures if the company is not living up to the implied terms, so that the recourse of the apprentice when dissatisfied is not to the courts but to withdrawal on his part and the seeking of other employment.

Age Limits for Apprenticeship

The general practice seems to be to prefer and in many cases to limit apprenticeship to those boys with an elementary education and sixteen to eighteen years of age at commencement, with a four year period of service. For high-school graduates and in certain trades requiring mature strength, the period is ordinarily three years in length and the age of entrance eighteen or over.

The arguments adduced are that state laws relative to the employment of minors do not permit the employment of boys under sixteen in the handling of machinery, and that it is desirable to commence the apprenticeship directly upon leaving the public school, as the boy under those conditions has not lost the habits of study, regularity and punctuality to which the school has accustomed him, by a period of shifting in the more or less irresponsible casual employment open to juveniles.

For the machinists, patternmakers, and most of the trades of the railroad shops and shipyards also, the work is not too heavy or exacting for these immature workers. That the course should be four years in length for those sixteen years old upon entrance arises from the fact that it is not desirable to promote to journeyman's wages and responsibilities those who have not attained their majority. Moreover, there is sufficient content in the trades considered, both of manipulation skill and of related technical knowledge, if imparted upon the desirable part-time basis, to require the full four years.

Sometimes the period of apprenticeship is shortened several months as a reward for unusual capacity and competency. This is a practice which seems desirable as an encouragement to effort, and offers no radical departure from the standard policy. For high-school graduates the age minimum of eighteen is established, in general, by the fact that such a course can not be completed before reaching that age; and the three-year apprentice period is justified by the same arguments that recommend the four-year course for grammar school graduates.

It seems unfortunate that statutory prohibitions as to the employment of minors in some states prevent the employment of apprentices under eighteen years of age, as these limitations have prevented the normal development of apprenticeship in the trades where the sixteen-year old may safely be employed. The chief difficulty is that in the initial stages of learning a trade the productive worth of the apprentice does not warrant payment of wages over about one-fourth paid the adult mechanic, and a young man who has reached eighteen is usually unwilling to forego the more attractive wages paid the operative specialist. Moreover, he has often been knocking about at various juvenile employments for several years, so that he has lost a desire or willingness to study, some of which is essential for the acquisition of a skilled trade.

Just antedating the recent World War, the prevailing rate of pay for apprentices started at about 12 cents an hour for the first year, and increased to about 20 cents an hour for the fourth year, for a week ranging from 50 to 60 hours. It is now extremely varied, depending upon locality and occupation, but in general it can be said to have increased from 50 to 100 per cent or more, the improvement being most apparent in the third and fourth years. The working week is, however, shorter, varying from 44 to 50 hours, the week being longer than this in but one or two plants visited. There should also be noted the increasing amount of company time, for which regular pay is granted, devoted to related technical instruction in the shop school.

During the war there was much dissatisfaction among the apprentices with the fact that, owing to their indenture agreements, their pay did not advance as rapidly as the corresponding journeymen's wage and the increasing cost of living. A solution, devised by the Mergenthaler Linotype Co., and stipulated in their "condi-

tions of apprenticeship," which may be expected to automatically adjust to changing rates of pay in the plant, is to pay on the basis of a percentage of the prevailing or basic hourly rate paid to the journeymen of the trade involved. One advantage of such a variable rate at the present time is that it would adjust as easily to a decreasing scale of pay, as it would be an undesirable anomaly to find apprentices paid during their fourth year as much as journeymen. Another practice to be commended in some plants is the payment of a premium of 2 to 4 cents for superior work in school and shop.

The Apprenticeship Bonus

It is a tradition of apprenticeship that a bonus is to be paid the apprentice at the conclusion of his term of service. This sets a prize on the completion of the course, which has doubtless been of great value in holding the apprentice, particularly toward the end of his apprenticeship. The traditional amount is $25 for each year of service, being $100 in the four-year course and $75 in the three-year course. Many plants have found it advisable to increase this amount. In one case a second bonus of $100 was paid if the apprentice continued with the company one year after the completion of his apprenticeship with them. The company already referred to carries the percentage policy to this matter of bonuses as well, and pays 10 per cent of all wages received by him during his term of service. At present rates of pay this would be over $400.

Two companies require a deposit, $25 in one case and $50 in the other, as a guarantee that the apprentice will remain throughout the period of apprenticeship. It is, of course, returned with interest when apprenticeship is completed. A company with a long tradition for good apprenticeship may find that this works efficiently in holding their apprentices through the course; but a company just embarking upon apprenticeship will probably find it undesirable, as many capable young men may hesitate to venture even $25 of their funds on an apprentice program of whose merits they are uncertain. There seems no tendency to increase the practice, which in general should be condemned.

The practice seems to be general of conferring a certificate of apprenticeship upon completing the course. As there are, however, no uniform standards, its value depends much on the standing of the company conferring it. Three national organizations have, however, been active in promoting more uniform requirements: The National Metal Trades Association, The National Industrial Conference Board, and the National Association of Corporation Schools.

The American Locomotive Co., in addition to the usual diploma, issues a duplicate of pocket or post-card size, which is intended to be a convenient means of establishing the completion of apprenticeship in seeking a position. Others issue buttons for the coat lapel, which are useful in identifying the apprentice graduates among the working force and, of course, would be an equally useful proof of apprentice training in an employment office of another plant when seeking relocation. In this connection it should be recognized as valuable experience to leave the plant where the apprenticeship was served to learn the practice of other shops and in related industries. Moreover, if all companies in proportion to their force in the skilled trades practiced appenticed-training none would suffer by this practice.

The report of the Federal Board for Vocational Education for 1919 states the following enrollment in Smith-Hughes aided schools: Evening, 42,094; part-time, 17,276; all-day, 15,111; total, 74,481. This includes, of course, the building trades, auto-mechanics and chauffeurs, etc., as well as the metal-working and printing trades.

Considering each of these branches in turn, it is not believed that the night school should be considered as making serious contributions to the manipulative phases of such skilled trade as toolmaking, diemaking, die sinking, patternmaking, the all-around machinist in the maintenance department, and the crafts of the shipyards and railroad shops. Assuming that a workman attended fifty nights for two hours per night, he would have put in at a maximum one hundred hours, the equivalent of two weeks in a shop. This would be largely work of an exercise sort, which would in no sense approach trade mastery. Such shop work may function to some extent for trade extension and trade conversion purposes. Thus it may be possible for a workman to learn enough to become a lathe or milling machine operative, and hence to broaden his adaptibility in a shop, so that it is possible he might become a substitute hand in piece production.

The shop arithmetic and drafting classes may contribute to the technical training of the adult workers as trade extension, but all consulted in the industries are agreed that this should be considered only as crutches to insufficiently prepared mechanics.

Part-Time Schools

The essential condition for effectiveness of the part-time schools in training skilled craftsmen is varied experience at all manipulative phases while at regular shop production. Of course this combination amounts to apprenticeship, even though unorganized; and it should be remarked that there has been established no authority in administration of the law to insure such transfer about the plant as will provide the varied experience, and it is doubtful if there can be except through the cordial co-operation of a plant's management.

The all-day vocational schools scheduled for the fourteen to sixteen age period, if provided with sufficient equipment for experience at all operations and machines utilized in the trade and with a source of production jobs sufficient for experience at all types of practical work, could probably take the place of the separate training shop desirable for the first year or two of the apprenticeship course. Those conditions seem satisfactorily met in the trade school in the Ford plant. There all types of jobs can be secured from the parent plant, and in sufficient quantities so that an average of $80 per month of salable products is made by each of the students in the two-thirds of his time that he is in the shops. This permits the payment of reasonable apprentice wages, which has been attempted in no public trade school.

With, however, the usual inadequate equipment of the machine shop and no attempt at quantity production, the ordinary graduates of the machine shop departments, if they finally enter industry, do so as lathe hands or as other specialists. The management of several companies in stating their attitude toward the vocational school usually mention instances where graduates on applying for a position admitted that their experiences on the milling machine had been confined

to cutting a few notches on a gearwheel. This experience should be compared to the three months of continuous practice at the milling machine for adult learners in the vestibule school of a machinery company. Furthermore, other than the repair and upkeep of the school machines, there can be no experience of the nature of maintenance work.

Another element that should be considered relative to the vocational school is that not sufficient effort is made by it to select the boy with superior mechanical ability. While this may come about to some extent through the working of the inclinations of the boys concerned, it is too often apparent that the vocational schools are largely the dumping ground for the less capable.

About the same discussion holds, however, relative to the printing trades as for metal working. In large printing centers the trade of the all-around printer has ceased to exist, and in its place we have clearly defined definite trades, such as that of the hand compositor, the linotypist, the pressman and feeder, the lithographer and the bookbinder. Some of these are well adapted to apprentice training, of which hand compositing is an oustanding example. Others lend themselves to intensive or to part-time training, depending upon whether the training is for the novice or for one already engaged and seeking training for promotion. All suggest the vocational school closely linked to a friendly large publishing company, or to a co-operating group of associated smaller printing plants.

The plan of education by which the student spends one week in school and one week in the shop is based on the assumption that school progress and shop practice are of exactly equal importance in the acquisition of the trade involved. The modification worked out in the Ford trade school of two weeks in the shop to one in school assumes that for the acquisition of a trade the shop practice is the more important element in attaining trade mastery. This conforms to the experience acquired by the now long developed apprentice schools. It is also believed that a corporation co-operating in maintaining such an institution can afford to pay the same piece price for the production of the training shop as in its regular production departments, as by that means the better class of boys will take the course and the company will benefit in the superior quality of future mechanics graduated and recruited to its force of skilled workmen.

It should be said for the co-operative school that thereby full-time utilization can be made of the expensive equipment of the training shop. This is a matter of no mean economic importance when it is considered that a half million dollar plant is necessary to train three hundred boys for the machinists' and toolmakers' trades.

In many of the larger cities are found well-endowed private institutions, usually designated institutes, or operating under the older name of mechanics' institutes. These in some cases have made marked success in their work, particularly in such vocations as possess large technical elements. In the trades we have here been considering they have been successful in providing usually superior extension instruction in evening departments. They have also been useful to provide the promotion training for superior young men, who had already considerable practical experience and desired by a brief course either to prepare for advancement or to develop from a specialty to the all-around skill of the toolmaker. They would be, probably, the chief reliance for this purpose, if the apprentice method completely disappeared.

In some cases the vocational departments of technical high schools have approximated this service. The unsatisfactory condition in them is that ordinarily, owing to academic restrictions, they have not lent themselves to aid the student who has had considerable practical experience without the required book instruction laid out for entrance and advancement. It is believed that they would function more efficiently if they were organized to operate continuously throughout the year, and if they encouraged, by adjusting their courses for that purpose, the student to utilize one or two terms each year at study and training in their classes and shops, from the time when he graduated from the elementary school until he was twenty, while he put the two or three other terms each year in productive employment.

This work could also be provided on the co-operative basis of a week in school and a week in the shop, which is now being successfully worked in some places. Their marked success has, however, been in preparing for the more technical or engineering employments, such as that of draftsman or electrician.

Probably more men in American industry have gained the technical phases of their trades from correspondence schools than by any other means. Their text books are prepared to be read by the student having a limited knowledge of mathematics, and the lesson sheets provided permit study at any free time. Moreover, the teaching manual in pamphlet form can readily be carried in the pocket and studied in direct relation to the tool or problem to be met. The requirement that all problems must be completely solved is in contrast to the evening school where regularity in attendance is frequently the only check on progress and assimilation.

They, however, lack the contact of teacher and pupil wholly and there is, of course, no organized method to provide the varied experience desirable in the manipulative phases of the trades involved. They should also be condemned for exploiting ignorant laborers who have been induced to purchase the courses by field agents, who have covered the country and painted rosy pictures of munificent engineer's and manager's salaries to those who have not the rudiments of an elementary education. This is, of course, in direct contrast to such work as the University of Wisconsin extension courses, where the texts have been admirably prepared for study and there has been no promotion among those incapable of their use.

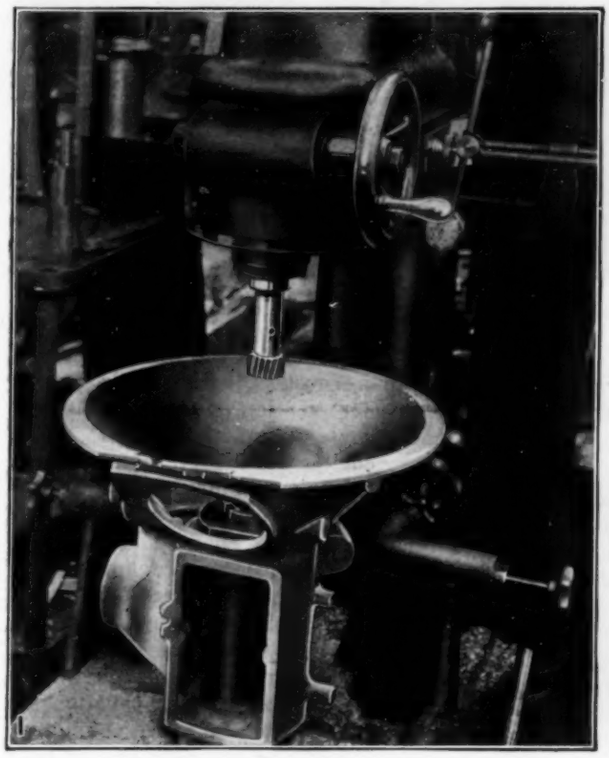
The Wills Sainte Claire Transmission Case

Tool for Facing a Surface of Irregular Shape—Special Milling Machine with Four Spindles —A Comprehensive Gage—Machine for Grinding Center Holes

By FRED H. COLVIN
Editor, American Machinist

THIS transmission case is of the "bell" type and bolts direct to the end of the crankcase. After cleaning and inspecting, it is water tested for blow holes or leaks and then spotted in three places for locating in future operations. The primary and secondary shaft holes are then bored and reamed, the flanges rough-turned and the inside front end of the secondary shaft hole is profiled.

The pad on the inside of the front end of the transmission case for the secondary shaft is in somewhat the form of a spherical triangle and, owing to the interference of other parts, cannot be faced with an ordinary single cutter. The operation is performed on a 24-in. Cincinnati drilling machine as shown in Fig. 1. Details of the special facing head designed for this work are shown in Fig. 2. The spindle *A*, which carries the cutter, is driven by a universal joint at *B*, so as to permit it to be moved to reach all parts of the surface to be milled.



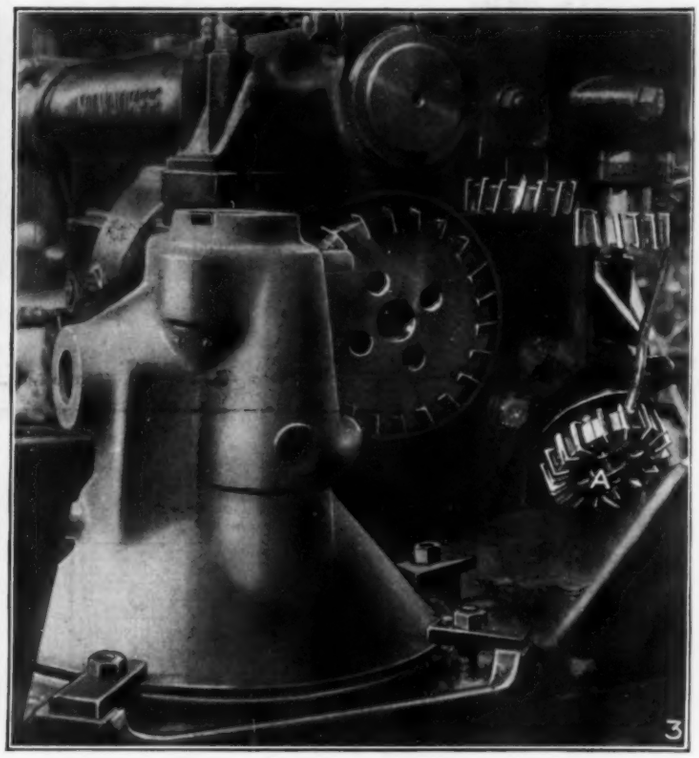


FIG. 1. FACING A TRIANGULAR FLANGE. FIG. 3. SPECIAL MILLING MACHINE WITH FOUR SPINDLES

The whole head is mounted in the housing *C* which is fastened to the frame of the drilling machine, on which it is operated. Inside the lower end of the frame *C* is a head *D* which carries the spindle and also the gears shown in the upper view. These gears *E*, *F*

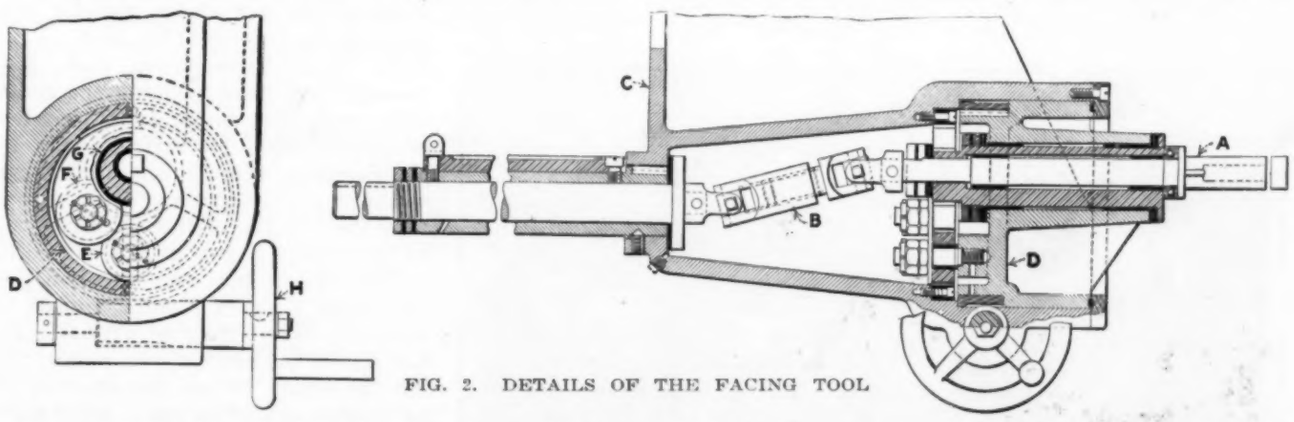


FIG. 2. DETAILS OF THE FACING TOOL

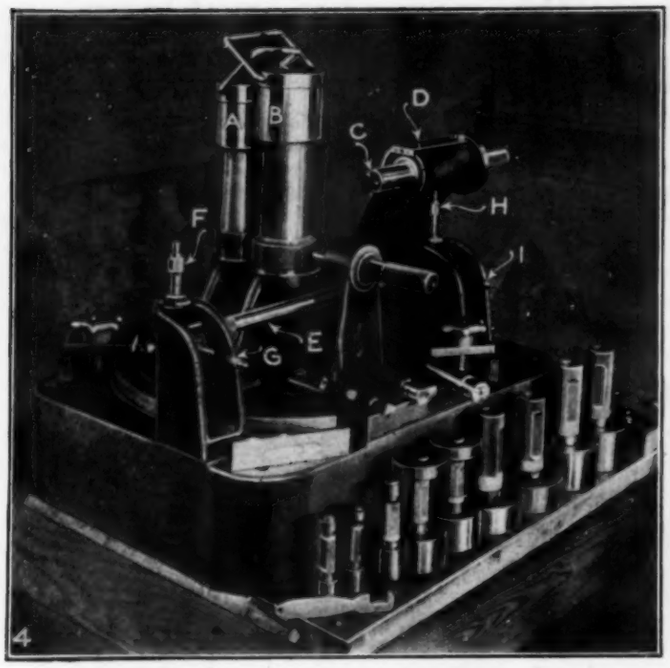


FIG. 4. INSPECTION GAGE FOR CASE.

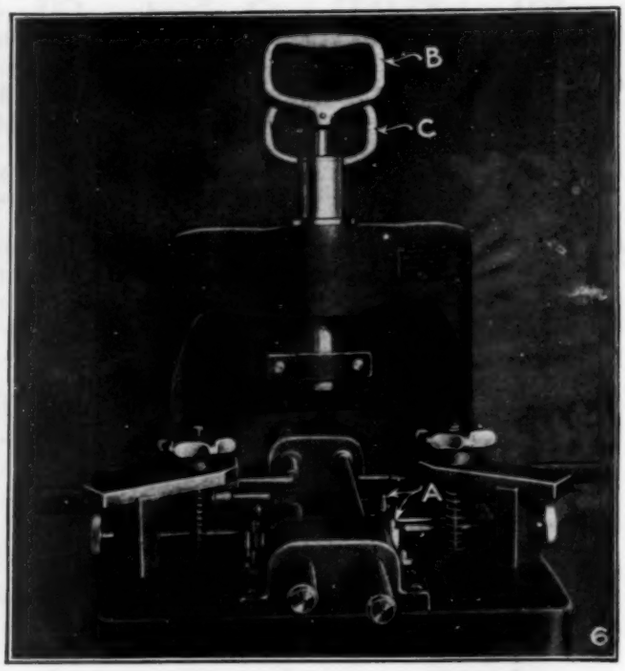


FIG. 6. INSPECTION GAGE FOR COVER

and *G* in connection with a gear on the outside of *D*, give the desired motion to the milling spindle.

The handle *H* operates a worm which turns the head *D*. An internal gear in *D* operates the pinion *E* which turns *F* and this, in turn, revolves the eccentric gear *G*, which changes the relative position of the center of the milling spindle as the head *D* turns. This combination moves the milling spindle in a triangular path and faces the pad previously referred to, in one revolution of the head *D*. This makes a difficult operation quite simple.

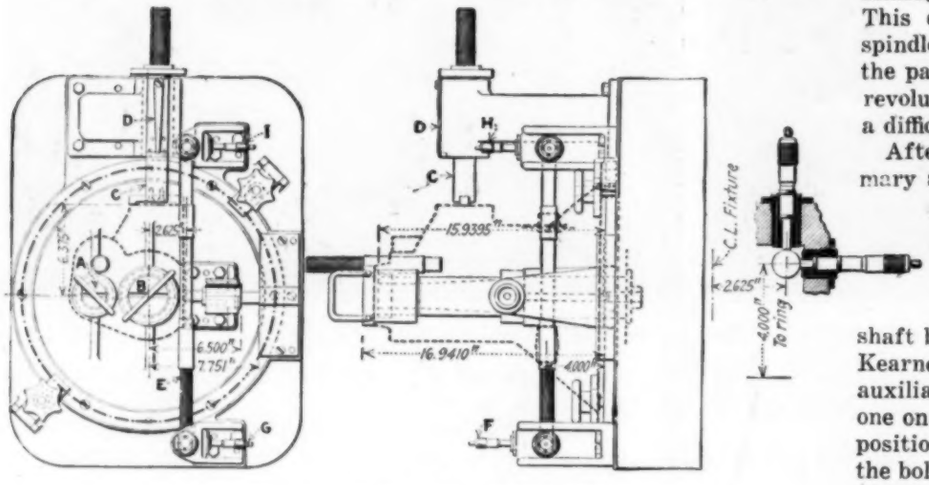


FIG. 5. DETAILS OF THE GAGE

After finishing the face of the primary shaft hole, the flange is drilled, which brings the case to the milling operation shown in Fig. 3. In this operation the top cover-hole pad, hand-hole pad and the rear end of both shaft bosses are surfaced on a special Kearney & Trecker machine with three auxiliary spindles, two vertical and one on an angle as at *A*. The work is positioned by the flange and some of the bolt holes. Then comes boring and reaming the shaft holes, drilling and tapping the many holes that go to make up a transmission case, line reaming and hand reaming the shaft holes, as a quiet running transmission is only secured by extreme care in these details. Finally comes cleaning, washing and inspection. The inspection fixtures are of interest also, two of them being shown in Figs. 4 and 5.

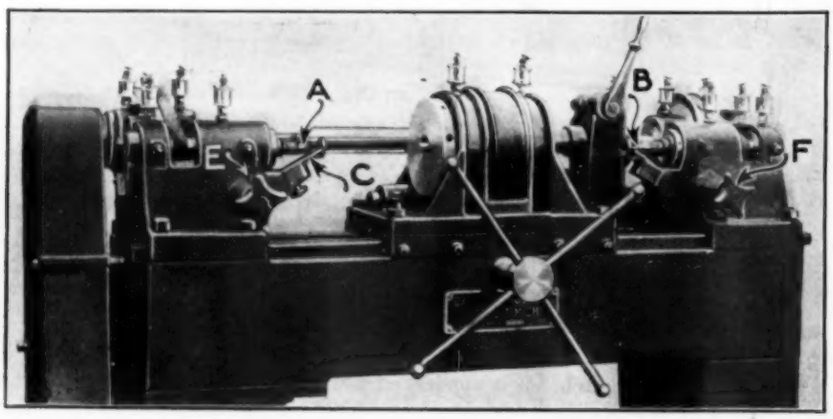


FIG. 8. CENTER GRINDING MACHINE FOR GEAR SHAFTS

The case is put over the two uprights and the caps *A* and *B* slipped in position. The swinging arm *C* tests the side of the case for squareness, the arm revolving to test the opening at various points. The multiplying indicator at *D* gives very close readings at this point. The crosshole for the clutch shaft is tested by the bar *E* which

passes through the hole when the case is in place. The four micrometers, *F*, *G*, *H* and *I* measure the exact position of the bar in both directions. Details of this gage are shown in Fig. 5, which is lettered to match Fig. 4. The plug gages in front of the fixture give some idea of the carefulness of the inspection.

The cover of the transmission case carries the gear-shifting cross shafts and also extends up to support the ball joint of the lever itself. The gage for testing this cover is shown in Fig. 6 and in detail in Fig. 7. The case is positioned by the dowels shown in Fig. 6, two of which are marked *A*. The various shaft-hole openings are tested by the bars shown running in both directions. Handles *B* and *C* control plugs which fit into the upper openings as can be seen in Fig. 7. The construction of the multiplying indicator shown at *A* is given in detail at *B*. The alignment of the two parts is shown on the one needle or pointer.

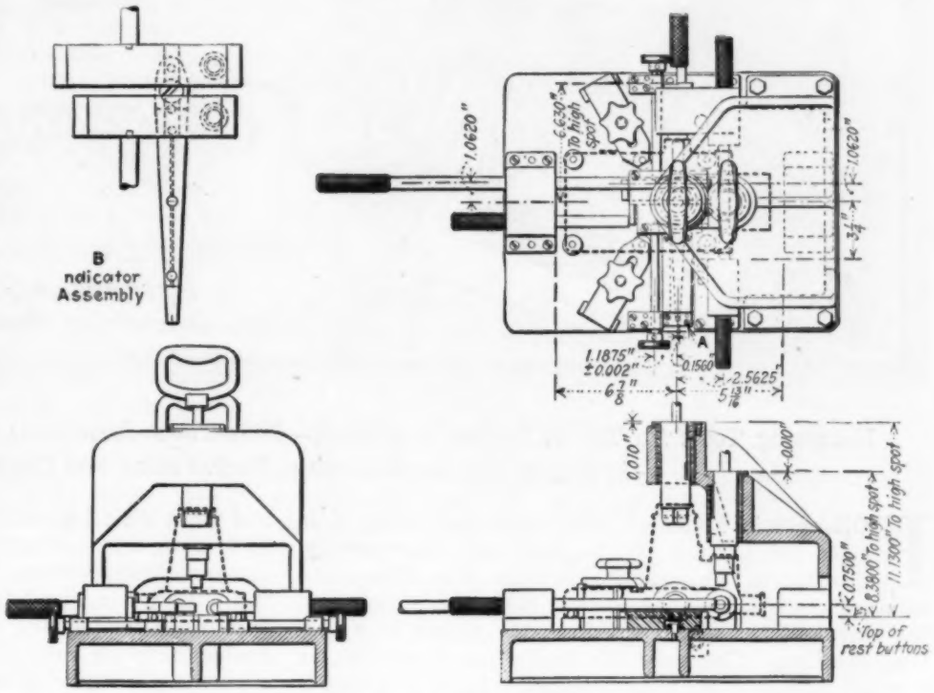


FIG. 7. DETAILS OF COVER INSPECTION GAGE

Although not a part of the transmission case, the secondary gear shaft is closely related to it and the care in securing a perfectly straight shaft is interesting. After the shaft and its gear are heat-treated and hardened, they are put in the central driving head of the special machine shown in Fig. 8, which was built by the Cadillac Tool Co. for this work. The shaft is centered from the pitch line of the gear and the centers in both ends of the shaft are ground true with the gear itself, thus eliminating the errors due to distortion in hardening.

The grinding wheels resemble pointed lead pencils and can be seen at *A* and *B*. Each head carries a diamond tool as can be seen at *C*, so that the wheels can be kept in just the right condition at all times. Movement of the hand knobs *E* and *F* traverses the diamonds past the wheels and trues them. The capstan wheel moves the head carrying the work, first to one wheel and then the other. The results have been very satisfactory in producing quiet running transmissions.

Big Shops Versus Little Shops

BY H. C. CLINTON

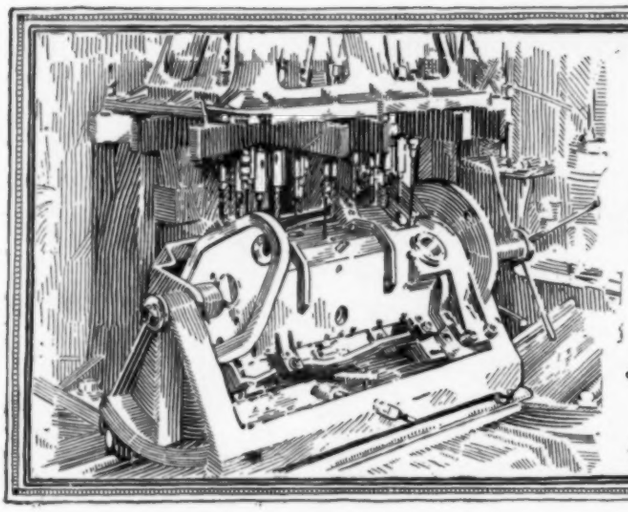
Mr. Forbes' conclusion, on page 99 of AMERICAN MACHINIST, that small shops can compete with big ones is certainly true in many cases, especially such a case as he cites.

In at least one large shop his job would be handled as follows: The inquiry is referred to the estimating department, which fixes a price based on the time required and the value of the material used, and reports in writing to the sales department. The sales department acknowledges receipt of the inquiry and quotes the price. When the order is received, if not accompanied by a check, it must be approved by the credit man, then sent to the cost department, which will issue a ticket to the shop authorizing the work and establishing a time charge number, against which the time of every person who works on the job must be charged, and perhaps stating the total time allowance as established by the estimating department.

The foreman of the department that is to do the work must now send a written order to the crude stock department for the material, using, of course, the ticket number which identifies the job. In the crude stock department the stock required, in this case tool steel 1⅛ in. in diameter, is cut off to the length specified on the order, weighed, tagged with the ticket number and sent to the department where the work is to be done. The material order with the weight entered on it is sent to the cost department, where its value will be charged against the job.

It is readily seen at this point that quite a lot of time has been consumed, which someone must pay for, before the actual work of making the piece has commenced. In the large shop a certain amount of red tape is absolutely necessary for the orderly and systematic handling of the work; and if the price quoted for one piece, as required in this case, was large enough to actually include a profit, it would certainly appear prohibitive. The preparatory work and accounting required for this one piece would cost very nearly as much as it would for 1,000 or 10,000 pieces, but in these quantities it becomes a small charge "per each."

In regard to reducing the cost of doing this job or altering the procedure, I would suggest that it would be a waste of time to cut off a piece of tubing for supporting the work, if parallels are available, and I would use a combination center drill with a ⅛-in. drill point for the ten ⅛-in. holes, as these combination center drills are so stiff that there is no danger of the points "running off" and spoiling the accuracy of the work.



Tool Engineering

By
Albert A. Dowd and Frank W. Curtis
President and Chief Engineer
Dowd Engineering Company, New York City

Recessing Tools for Turret Lathes Continued—Slide Tools, Automatic and Double-Acting Tools —Arrangements for Recessing, Back-Facing and Chamfering

FOR certain kinds of light recessing work, slide tools of various kinds are used successfully. Several of them are shown in Fig. 324. The example at *A* is designed so that it can be attached to the turret of the lathe, and the slide stands in a vertical position. The body of the tool *A* is cut out in dovetail form, and the slide *B* is moved upon it vertically by means of a screw operated by the handle *C*. The slide is provided with two holes at *D* and *E*, in which bars can be placed with cutters suitable to the nature of the work. The slide is capable of adjustment, and the two holes allow for considerable latitude in tool position. For under-cutting, back-chamfering on shallow work, and cutting recesses this type of tool will be found very useful. An application to a recess is shown at *F*, a short bar *G* being used with a cutter at *H*.

Another type of slide tool operating in a horizontal plane is shown at *K*. This example has a stem *L* which fits the turret hole. The casting is dovetailed to receive the slide *M*, which is operated by means of a ball-crank *N*. Adjustable stops are provided at *O* and *P*, so that the depth of cut can be regulated accurately. The slide has two holes at *Q* and *R*, and in either or both of these, tools can be placed for recessing or chamfering. A micrometer collar is applied at *S*, so that accurate readings can be obtained. An application of this device is shown at *T*, a special tool *U* being used for the work. This type of tool is not capable of adjustment, and the size is soon lost in grinding, but for work coming through in small lots it will be found sufficiently good for the purpose.

The matter of gibbing should be carefully attended to in the design of any form of slide tool, in order that adjustment may be provided in the event of wear. A tapered gib is one of the best forms for this class of tool, although it is somewhat more difficult to fit. The adjustment, however, is easy and it is very little trouble to take up wear.

Cutting a Deep Recess

Mention has been made of the desirability of making recessing tools without spring, so that their action is positive. It is not always possible, however, to do this and yet a little ingenuity will often enable the designer to do away with springs and operate the tool by positive mechanical movements. A difficult operation in recessing is shown in Fig. 325, in which the work *A* is a long cast-iron sleeve having a recess cut in it at *B*, a considerable distance from the face of the work *C*. An accurate job was required, not only as to the depth and width of the recess, but also in its position from the face of the work. The design of the tool is one that can be applied to many other recessing operations in more or less modified form.

The bracket *D* is located on the turret and fastened to it by means of screws. The cylindrical portion *E* is bored out through its entire length. It is fitted with a pilot at the forward end *F*, and the pilot is guided in a bushing in the chuck, as shown. The bar *G* is carefully fitted to the hole in the long cylindrical sleeve, so that it can be moved freely in a longitudinal direction. It is cut away at *H* and slotted on a 30-deg. angle at *K*. The toolblock *L* is fitted with an angular tongue which engages with the slot on the bar. The recessing tool is held in the block by means of a screw at *M*, and adjustment is provided by means of a headless setscrew at *N*. The block slides freely through a rectangular slot cut in the outside sleeve.

A rack *O* is fitted to the rear end of the bar, as shown, and the pinion *P* engaging with it is used to

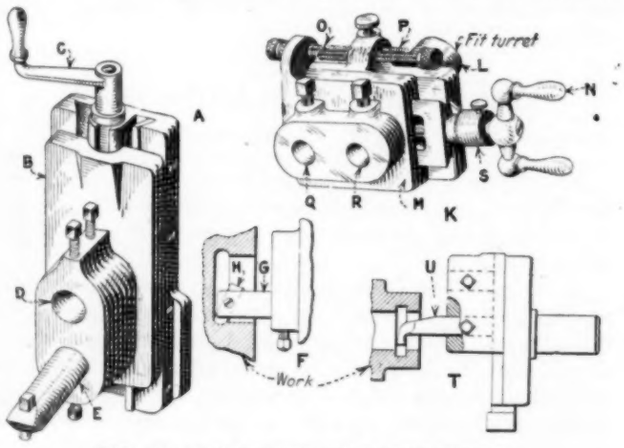


FIG. 324 VARIETIES OF SLIDE TOOLS

For the authors' forthcoming book. All rights reserved.

move the bar forward or backward, as may be required. The pinion is mounted on a shaft *Q*, at the upper end of which there is a graduated handwheel *R*. Accurate readings can be obtained by noting the position of the indicator point *S* in relation to the graduations on the wheel. The movement of the block carrying the cutter is positive in its action, and is controlled by the longitudinal motion of the bar. This is a very excellent type of recessing tool, and it can be depended upon to produce results without chatter, and at the same time rapidly. The exceptional method of support both for the tool and the bar itself gives a rigid construction and permits rapid operation. Care should be taken to provide air holes or vents at any points where there is likely to be a compression of air.

It is easily possible with a design of this kind to cut several recesses at the same time and keep their relations to each other accurately. If a number of recesses were to be cut, it would require only the addition of a suitable number of blocks or a single block with several cutters in it. It would also be possible to cut several recesses in different positions with a single

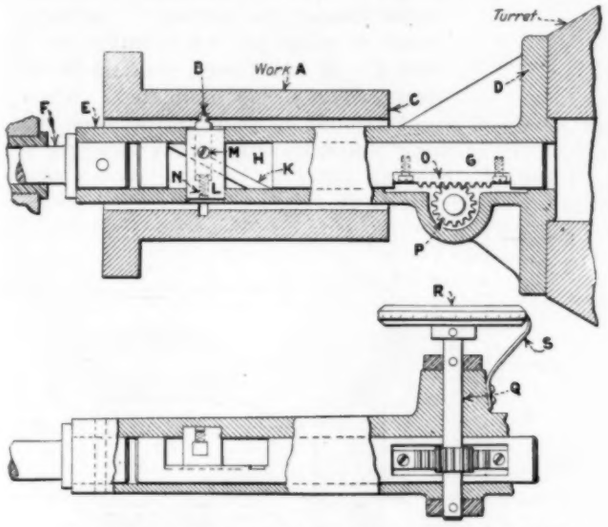


FIG. 325. TOOL FOR CUTTING A DEEP RECESS

cutter by providing suitable stops to obtain the correct spacing.

Automatic Recessing

Another type of tool which is automatic in its action and which is adapted for a small variety of work is shown in Fig. 326. In this example the work *A* has a recess cut in it at *B* a considerable distance from the face of the work. The dimension from the face to the recess is important. The casting *C* is bolted to the face of the turret and carries a bar *D*, which is piloted at the other end in a bushing in the chuck. The collar *E* fits the outside of the bar freely, so that the latter will slide through it easily. The tool is contained in a rectangular block *F*, which fits a corresponding slot in the collar *E*. Provision is made to compensate for wearing of the block by the use of two hardened shoes at *G* and *H*, which shoes can readily be removed and set up by means of paper.

The bar *D* has a straight pin in it at *K*, which acts against an angular slot *L* in the toolblock, thus controlling the movement of the tool. Adjustment for the radial position of the tool is made by the setscrew *M*, and the tool is held in place by two headless screws at *N* and *O*. The sectional view through the pin shows the construction quite clearly. The adjustment from the face of the work to the cutter is obtained by the

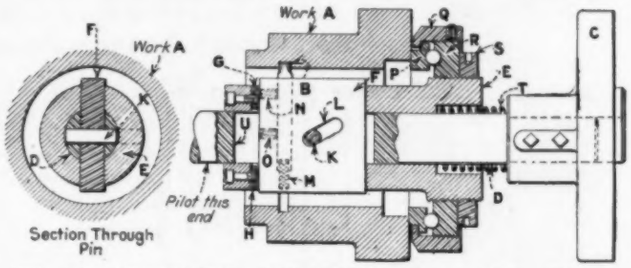


FIG. 326. AUTOMATIC RECESSING TOOL FOR SMALL WORK

position of the thrust bearing *P*, which is held in place by a threaded collar *Q* on the outside of the adjusting nut *R*. The various depths can be obtained by adjustments of the members *R* and *S*, the latter being used as a locknut. A stiff coil spring *T* forces the collar *E* forward until the front end of the sliding block strikes the edge of the slot at *U*, and when in this position the tool is placed in the work or removed from it.

It will be seen that as the turret moves forward with the tool in position, the pressure against the thrust bearing *P* holds the entire mechanism in a fixed position with relation to the work, while the turret carrying the bar *D* continues to travel forward. As it does so, the block *F* is moved outward by the action of the pin *K* in the slot *L*. The depth of the recess can be controlled by an adjustment of the turret stops or by some other convenient means. Unless the depth is particularly important, the turret stop will be found sufficiently accurate.

Recessing tools and those used for back-facing may be somewhat similar in their general construction. It is occasionally necessary to operate a mechanism of this kind automatically, an example being shown in Fig. 327. The work *A* is held in a special fixture mounted on the nose of the spindle. The operation to be done is the back-facing of the surface *B*, and is similar to a recessing job. A cast-iron bracket *C* is fastened to the turret of the machine, and at its forward end a pilot *D* is fitted. This pilot enters the bushing *E* in the spindle of the machine and supports the entire mechanism rigidly.

On the body of the tool a dovetail slide *F* is so mounted that it is free to slide in a longitudinal direction. On the upper part of this slide, the member *G* is mounted and dovetailed to fit another slide. The slide *G* has a transverse movement, and it carries a bar *H*, which contains the facing tool *K*. The bar *L* is fastened to the turret bracket, and is beveled at the forward end where it comes in contact with the upper slide, as shown at *M*. It is backed up to take the thrust by the steel block *N*. The entire mechanism works against the thrust of the heavy coil spring *O*.

In operation the turret moves forward until the stop collar *P* strikes against the end of the bushing in the spindle. Continuation of the turret movement causes the bar *L* to move forward, thus forcing the slide *G* in a transverse direction and causing the tool *K* to face the back of the work. The longitudinal slide naturally remains stationary with respect to the work and the turret bracket really travels under it. The coil spring *O* holds the sliding members *F* firmly against the bushing and prevents any longitudinal movement of it.

As the return movement of the tool would be dependent upon the pressure of the spring *O*, considerable trouble might be caused if this spring failed to act when removing the device after the operation. Therefore, as a precautionary measure, the bar *L* is slotted at *Q*, so that the backward movement of the turret acts upon the pin *R*, which is contained in a lug on the slide *G*. If anything were to happen to the spring, the slot and pin would serve to pull the slide back, so that no trouble would be caused.

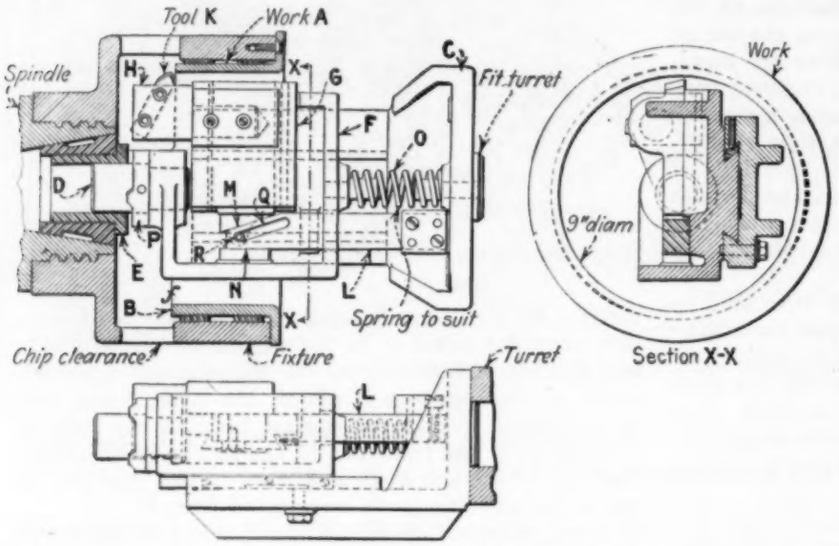


FIG. 327. AUTOMATIC BACK-FACING TOOL

In designing tools of this kind, great care must be exercised to make sure that all parts are rigidly supported, and precautions must be taken to guard against trouble which might be caused by the sticking of moving parts. The stop collar *P* can be provided with a ball thrust bearing, if this is considered desirable. The dovetail sliding members must be furnished with suitable gibs to take up wear.

Double-Acting Tool

The widths and diameters of recesses are not usually held within very close limits of accuracy, but occasional cases are found where very close tolerances are called for. Such an example is shown in Fig. 328, in which the work *A* is a cylinder having a recess cut at *B* in accurate relation to the end of the casting *C*. Both the depth and width of the recess are important, and it is therefore necessary to design a tool in such a way that these sizes will be machined accurately.

The tool was designed for use on a drilling machine, but the principles illustrated can readily be adapted to tools for use on other machines such as an engine lathe, turret lathe or boring mill. As originally designed, the bar *D* was arranged to fit a quick-change chuck. In using the recessing tool, this chuck was placed in position in the casting on a drill press, the spindle was brought down upon it and a rapid connection made. A sliding type of fixture was employed, in order to avoid very long movements of the drilling machine spindle. The sleeve *E* is a sliding fit on the bar *D*, and both bar and sleeve are slotted to receive the two blocks *F* and *G*, which are controlled and moved readily, but in opposite directions, by means of a pin in the bar and angular slots in the blocks, as shown at *H*. There are two cutters at *K* and *L*, so arranged that each of them cuts one side of the recess, a method employed in order to preserve the width. These cutters are notched at *M*, so that they engage with the sliding blocks mentioned, thus controlling the movement of the tools. The lower part of the sleeve *N* is threaded and fitted with a pilot *O*, which enters the bushing *P* in the fixture. The end of this pilot bar is provided with four bearing shoes *Q*, ground cylindrically so that they fit the inside of the bushing. The space between them allows clearance for any chips which may work down and get into the bushing. In the normal position, a heavy coil spring *R* presses against the end of the bar *D* and forces it upward, so that it draws the cutters inward and away from the work.

The position of the recess is determined by an adjustment of the stop collar *S*, which rests on the finished face of the casting *C*. Adjustment is made by the locknuts at *T* and *U*. A ball thrust bearing is interposed at *V*, as indicated. When in use there is a slight amount of clearance between the bottom of the bushing *S* and the top of the locknuts *T* and *U*, and the bushing does not revolve during the operation. The depth of the recess is controlled by an adjustment of the stop collar and locknut at *W*. This arrangement gives a freely moving tool and no thrust on the end of the casting, as this thrust is taken up by the bearing at *V*. A hardened and ground seat *X* fits in the slot and takes the pressure of the cutters, to avoid wear on the sleeve itself. Note that the sleeve is driven by two keys *Y*, in order to obviate any torsional stresses on the cutter blocks.

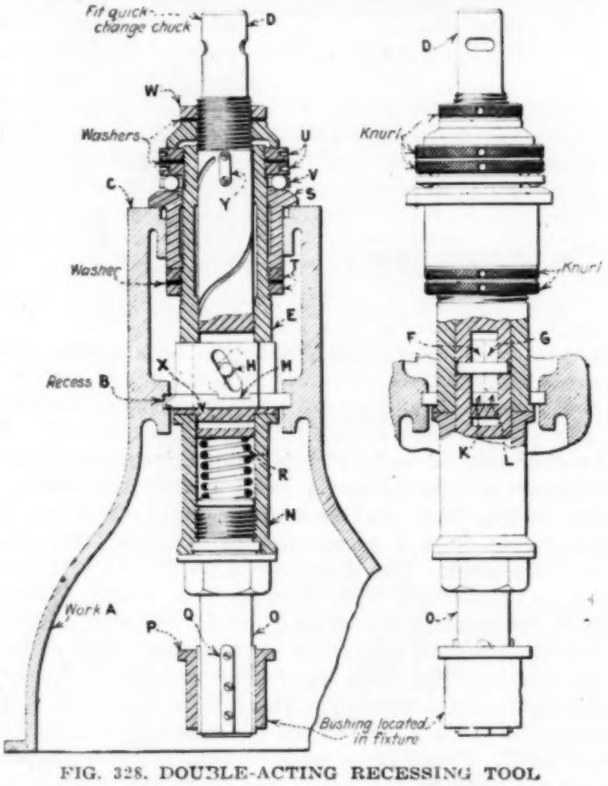


FIG. 328. DOUBLE-ACTING RECESSING TOOL

Standardization of Herringbone Gears

These Recommendations Are the Result of Careful Investigation by a Committee of the American Gear Manufacturers' Association

THE recommendations herewith submitted for adoption are the result of the majority opinion of the members of the American Gear Manufacturers' Association, as expressed by them in their answers to questionnaires sent out. The first questionnaire was thoroughly discussed at the Detroit meeting and modifications suggested.

The suggestions were considered by the committee, which resulted in a second questionnaire being sent out in June, 1920. This questionnaire was discussed at the general and committee meetings at Lake Mohonk, and further modified and added to. The various questionnaires and discussions have resulted in the herringbone gear recommendations herewith submitted for adoption as recommended practice.

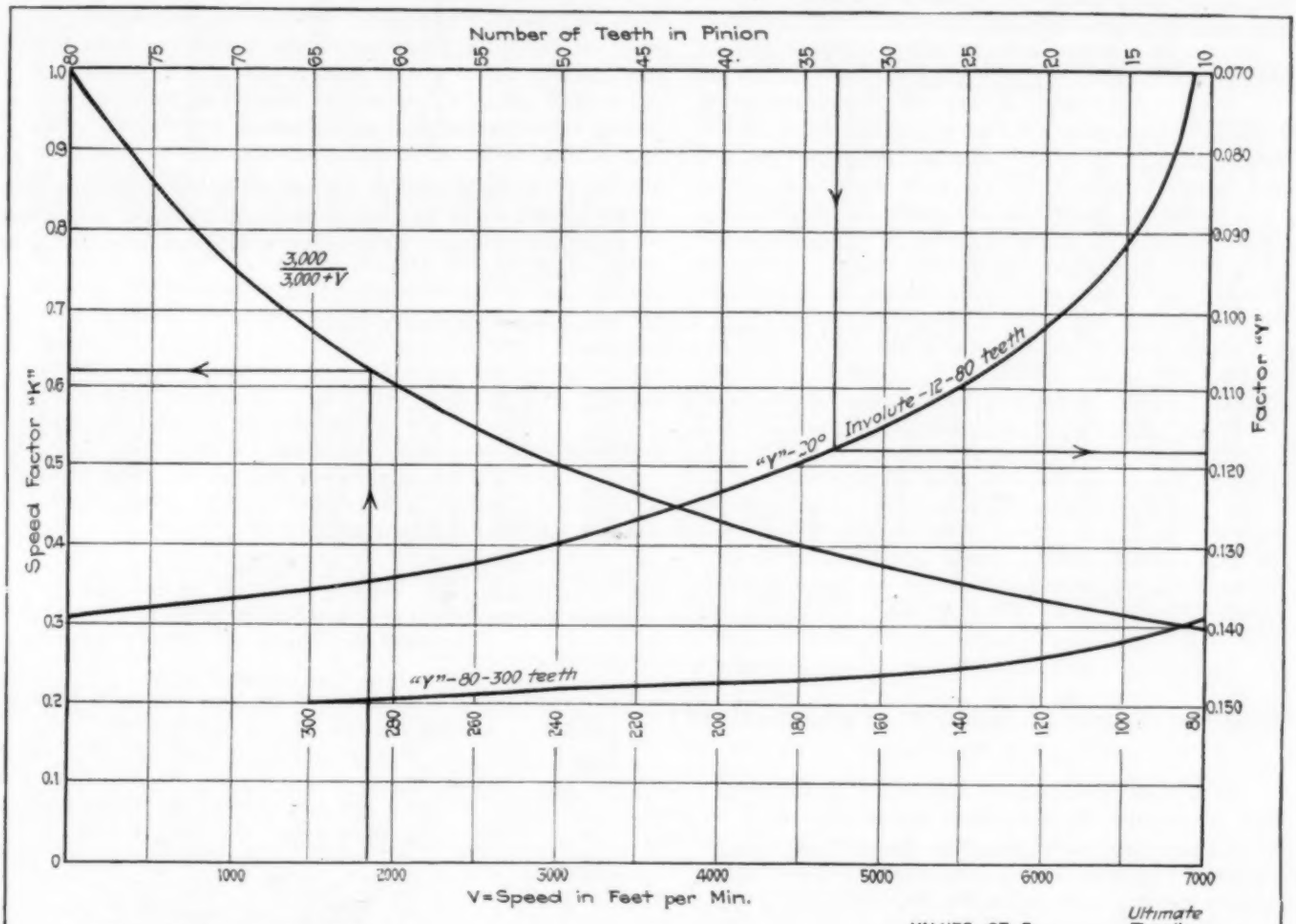
All calculations of pitch, spiral angle, addendum and dedendum are based on diametral pitch in plane of rotation.

(1) The use of diametral pitches only.

(2) Spiral angle (of teeth with axis) 23 deg.

(3) Pressure angle (in plane of rotation of gear) 20 deg.

TABLE I. STRENGTH OF HERRINGBONE GEARS



$W = \frac{S}{V+600} PFYK$ — (Safe for wear, well oiled) (For grease lubrication)

W = Load in pounds (multiply by 0.8 to 0.62)
S = Working stress (no speed)
P = Circular pitch
Y = Factor (from curve)
F = Face in inches
K = Speed factor (from curve)

VALUES OF S

		Ultimate Tensile
Chrome nickel steel Heat treated	30,000	120,000
Forge steel - 0.50 C.	25,000	100,000
Forge steel - 0.30 C.	20,000	80,000
Cast steel	15,000	60,000
Cast iron	8,000	24,000
Bronze 88-10-2	8,000	24,000

For continuous contact of teeth Min. Face = 6 times C.P.

EQUIVALENT VALUES OF DIAMETRAL PITCHES

D.P.	1¼	1½	1⅝	2		2½		3	3½	4	5	6		8
C.P.	2.51	2.09	1.79	1.57		1.25		1.04	0.897	0.785	0.628	0.523		0.392
Min. Face Rec.	15"	12½"	11"	9½"		7½"		6½"	5½"	5"	4"	3½"		2½"

Example: Pin, 33 T., Gear 197 T., 2½ D.P., 28 F., 1860 Ft. per min. Pitch speed

Material: Chrome nickel Heat treated } Steel pinion, rolled steel gear rim

$W = 15{,}000 \times 1.25 \times 28 \times 0.118 \times 0.62 = 38{,}400$ lb. $H.P. = \frac{W \times V}{33{,}000} = \frac{38{,}400 \times 1860}{33{,}000} = 2150$ H.P.

(4) Pitch diameter $= \frac{P}{N}$

(5) Outside diameter $= \frac{N \text{ plus } 1.6}{P}$

(6) Short tooth, with addendum $\frac{0.8}{P}$

(7) Dedendum $\frac{1}{P}$

(8) Total depth $\frac{1.8}{P}$

(9) Minimum width of active face equal to $\frac{16}{P}$

Active face equals sum of right and left helical teeth. Total face equals active face plus width of groove.

(10) Formulas for strength of teeth calculated for wear as well as strength of materials, as per Table I.

(11) Width and depth of groove in center of blank for gears cut with single thread hobs at proper angle with axis of gear—Table II.

TABLE II. HOB SET AT AN ANGLE TO AXIS, HELIX ANGLE MINUS ANGLE OF HOB

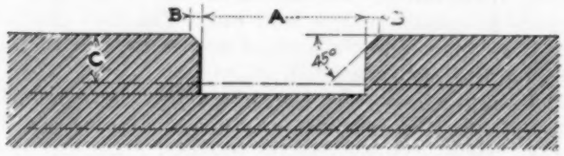
Diametral Pitch	A	B	C	No. of Threads in Hob
6	1 1/4	1/2	1/2	1
5	1 1/2	1/2	1/2	1
4	1 7/8	1/2	1/2	1
3 1/2	1 7/8	1/2	1/2	1
3	1 1/2	1/2	1/2	1
2 1/2	1 1/2	1/2	1/2	1
2 1/2	2	1/2	1/2	1
2 1/2	2 1/4	1/2	1/2	1
2	2 1/4	1/2	1/2	1
1 1/2	2 1/4	1/2	1/2	1

(12) Width and depth of groove in center of blank for gears cut by planing or shaping method equal:

Width 1/8 in.—Depth $\frac{1.8}{P}$ plus 0.01 in.

(13) Width and depth of groove in center of blank for gears cut with hobs at right-angles to the axis of gear—Table III.

TABLE III. DIMENSIONS OF GROOVES



Diametral Pitch	A	B	C	No. of Threads in Hob
8	1/4	1/2	1/4	4
7	1/4	1/2	1/4	4
6	1/4	1/2	1/4	4
5	1/4	1/2	1/4	4
4	1/4	1/2	1/4	4
3 1/2	1/4	1/2	1/4	3
3	1/4	1/2	1/4	3
2 1/2	1/4	1/2	1/4	3
2	1/4	1/2	1/4	3
1 1/2	1/4	1/2	1/4	3
1 1/4	2/4	1/2	1/4	3
1 1/4	2/4	1/2	1/4	3

(14) Enlargement in outside diameter of pinions with 17 teeth or less and corresponding decrease in outside diameter of gears to produce a full involute tooth, as per Table IV.

TABLE IV. ENLARGEMENT FOR PINIONS WITH 17 TEETH AND LESS

No. of Teeth	Diametrical Pitch 10	8	6	5	4	3 1/2	3	2 1/2	2	1 1/2	1 1/4	1 1/2	1
7	0.1181	0.1478	0.1976	0.2364	0.2954	0.3382	0.3938	0.4726	0.5906	0.6762	0.7882	0.945	1.181
8	0.1064	0.133	0.1782	0.2128	0.2662	0.3046	0.3548	0.4258	0.5322	0.6094	0.7102	0.8514	1.064
9	0.0947	0.1184	0.1586	0.1894	0.2368	0.2712	0.3158	0.379	0.4736	0.5424	0.6322	0.7578	0.9471
10	0.83	0.1038	0.1392	0.1662	0.2076	0.2378	0.2768	0.3322	0.4152	0.4756	0.5542	0.6642	0.8302
11	0.0713	0.0892	0.1196	0.1428	0.1784	0.2044	0.2378	0.2854	0.3568	0.4088	0.4762	0.5706	0.7132
12	0.0596	0.0746	0.1002	0.1194	0.1492	0.171	0.1988	0.2386	0.2982	0.342	0.3982	0.4772	0.5962
13	0.0479	0.06	0.0806	0.0958	0.12	0.1376	0.1598	0.1918	0.2398	0.2752	0.3202	0.3836	0.4792
14	0.0362	0.0454	0.0612	0.0726	0.0906	0.0142	0.1208	0.0145	0.1812	0.2082	0.2424	0.29	0.3623
15	0.0245	0.0308	0.0416	0.0492	0.0614	0.0708	0.0818	0.0982	0.1228	0.1414	0.1644	0.1964	0.2453
16	0.0128	0.0162	0.0222	0.0258	0.0322	0.0374	0.0428	0.0514	0.0642	0.0746	0.0864	0.1028	0.1283
17	0.0011	0.0016	0.0026	0.0024	0.0028	0.004	0.0038	0.0046	0.0058	0.0078	0.0084	0.0092	0.0113

Calculate the outside diameter as usual, then add the amount of enlargement to the pinion and subtract the same amount from the gear. Use only when the pinion has 17 teeth and less. Whenever two enlarged pinions have to gear together, the center distance must be increased by one-half the sum of the enlargement of the two pinions.

Cut the Force or Reduce Working Hours?

By A. W. Forbes

On page 849, Vol. 54, of American Machinist, under the above title, S. N. Bacon states that it is evident that I am "not familiar with the situation in various cities and in a variety of manufacturing plants." Very true: My experience for the last eight years has been confined to Worcester, Mass., but I do not think the situation is very different here than it is in most cities at the present time.

When Mr. Bacon speaks of "No help wanted" signs hanging out, he certainly is not speaking of Worcester. I do not know what kind of a reception the applicant gets inside the office, but in a recent trip through the manufacturing section I recently encountered fifty-seven signs of industrial companies, and in this list there was but one with a "No help wanted" notice that could be seen without entering the office.

Last Thanksgiving week, we had an unusually large number of applicants for work; about ten boys applied, but no one who appeared to be over twenty-one years of age. We have been averaging about two a week, and of this number I think there are very few who have not previously worked here or known someone who has. The large proportion of boy applicants was probably due to the fact that we employ a larger proportion of boys than most shops, it being my experience that those engaged before their eighteenth year stay longer and become more skilled at the work than those engaged later. I feel quite convinced that very few come looking for work without first finding out something about the place, and the prospects for finding work. Then as many others get the same clues, all the applicants crowd to the same shops.

It would seem as though the situation could be helped somewhat by an employment office that would make thorough examinations and give full data to the prospective employer. The information given by the public employment offices amounts to but little. Such information should include mental and physical tests, a complete record of the individual's experience, and his interests and desires in regard to both work and recreation. The latter often gives more information about a man's ability to work than any records of the work that he has done.

The Machinery Markets of Venezuela

Location of Venezuela—Controlling Agricultural Products—Predominance of Sugar Industries—Influence of Cocoa and Tobacco—Extent of Manufacture

BY HARRY CHAPIN PLUMMER

MISTAKEN ideas unfortunately prevail in our leading centers concerning not only the geographical position, but the social and economic background of the republic of Venezuela, nearest of all South American republics to the mainland of the United States and Canada. Distant 1,940 miles from New York, the capital city, Caracas, and her seaboard gateway, La Guaira, lie about on the parallel of longitude of St. John, New Brunswick, and on the parallel of latitude of the southern boundary of Costa Rica.

"Industrial Venezuela" lies within a broad belt of not more than seventy-five miles depth from the coastline and extending for from three hundred to three hundred and fifty miles from east to west. In this belt are Caracas, La Guaira, Maracay, Valencia, Puerto Cabello, San Felipe, Barquisimeto, all connected by motor-road and by the one thousand miles of railway which is Venezuela's total to date. The motor-road system which extends far beyond this area to such distant cities as San Fernando de Apure, on the headwaters of the Orinoco and to Ciudad Bolivar, the principal river port of the Orinoco system, and which even approaches "Los Andes," like the smaller railway mileage, has its immediate connections by foreign and coastwise navigation lines, maintaining regular schedules with the chief markets abroad and with the coast and interior river ports of the republic.

The agricultural production sustains the principal manufacturing activities, to wit, sugar, cacao (chocolate), cattle, timber, tobacco and cotton. Coffee, one of the basic items of productive wealth, is not subject to any specific manufacturing processes within the country, while Balata (rubber) and cocoanuts, two large agricultural factors of the lowlands, likewise are shipped abroad for industrial processing.

The Importance of Sugar Cane

First among the industries which contribute directly to factory operation is sugar cane, of which 3,000 metric tons is the daily average consumption upon an aggregate manufacturing area of 30,000 acres. The factories represent a total invested capital of $12,500,000. The best and most modern centrifugals from the United States, England and Germany are employed for the making of refined sugar papelon (a brown sugar usually put up in conical form and closely resembling maple-sugar in color and consistency), rum, alcohol and aguardiente, the latter the high-proof, fiery, daily beverage of the peones. The industry is, perhaps, the most highly organized and systematized of any in the republic. Steam is generated by waste portions of the cane stalk and the residue of the crushed cane. The largest and most modern plants, and of greatest production, are at or in the vicinity of Caracas, Maracay, San Mateo (near La Victoria), Tacarigua and Valencia and in the Maracaibo region.

Probably affording one of the best opportunities of any industry for the introduction of new and modern machinery is that of cocoa and chocolate production. Unlike the sugar factories, this does not fall back upon a large and well-distributed home demand and so has not developed its mechanical facilities to anything like the degree that have the sugar producers. By far the major portion of the cacao grown in the country is shipped to England and Europe and to the United States, where it is refined and made up into sweets and drinking chocolate. An excellent brand of eating chocolate has been evolved by the manufacturers at Caracas, but thus far they have not perfected a mechanical means for so preparing the product that it will not discolor and become excessively dry under the average tropical temperature. The machinery used in this industry is relatively old and obsolete, and new and up-to-date chocolate-refining and making apparatus, such as may insure the preservation of quality and appearance should find a market in Venezuela.

Live stock raising provides the fundamental elements for three separate manufactories. The milk production of the cattle furnishes the chief item of supply for the Lactuario de Maracay, a model dairy factory at the capital of the State of Aragua, which has become a national monopoly. There condensed milk and cream, butter and cheese are produced by twentieth century American and European processes and by the use of the newest and most approved machinery from this country, Germany and Holland. The killing center for cattle is at Puerto Cabello, where an English corporation maintains a large slaughter-house and freezing plant, in charge of experts from the packing centers of the United States. Besides there are abattoirs at Caracas, Cuidad Bolivar, Maracaibo and other interior cities.

In the Puerto Cabello plant machinery is not so much a factor in the actual killing and packing operations as it is in the incidental departments, such as the engine room, refrigerating section and rending and bone utilization plants. Power, generated hitherto from steam, has lately been derived from petroleum, which, of course, is one of the most common of Venezuelan resources today. It is obtained in the oil fields of the Maracaibo region and sent for refining to neighboring Curacao and thence re-imported into the country.

Leather Goods and Textiles

There are several old-established and well-equipped leather tanneries at Caracas, La Guaira, Valencia and other points central to the grazing areas and killing points, and an excellent quality and admirably finished stock is produced from cow, sheep and goat hides. All have an abundant outlet in the boot and shoe industry, which is, perhaps the most extensive, and certainly is the best organized, of the country's manufacturing interests after sugar production.

In the larger Venezuela shoe factories, where ready-to-wear shoes form the unit of production, the nucleus of a mechanical equipment is to be found, but a virgin field is offered for the machines and time-saving and speeding-up processes which have made the New England industry of today. The saddle production, similarly, is making notable strides, because of the superior finish and strikingly handsome appearance of the Venezuelan improvement upon the Mexican model. This is true, likewise, of belts, suit-cases and traveling

bags, purses and other leather goods manufactured in the republic.

English machinery of a type and pattern in use fifteen years ago in the Manchester and Birmingham mills is mainly employed now in the five or six cotton textile mills at Caracas, Valencia and at a city in the eastern section of the republic. Almost all of the machinery imported from England is about ready to be scrapped. The cotton industry of the country, having its basis in a field production of 43,000 quintals of seeded raw cotton grading as Cotton No. 2, is in its infancy; yet already $2,000,000 have been invested in manufacturing. As new industrial activities and higher wages, coupled with improved living conditions and a hint of the refinements of civilization, have brought about a complete metamorphosis of the native mestizo and Indian and negro working elements of the population, the demand for cotton goods—sufficient for wear at all times and in any but the higher mountain regions—not only will increase, but will expand in scope and variety. The larger mills of Caracas and Valencia employ several hundred hands and the element of time and labor saving already is giving rise to the need for the most improved features of motive and mechanical installation. The boll cotton is produced, in each instance, almost within sight of the spindles and what with a rising tariff against importation of the finer, fancier cottons, the only grades now finding a profitable entry into the country, the native industry is entering upon an area of great productivity and prosperity. The English machinery models may be supplanted, however, only by a most careful study of the field and the adoption of a service plan wherein the actual sale of the machinery will be but incidental to an all-round betterment of processing. But with the introduction of a comprehensive survey of the needs of the industry from field to market and the demonstration of actual economies to be realized, the opportunity for machinery contracts in the cotton mills is among the best the republic has to offer.

American Cigarette Machinery Used

Tobacco of generally splendid quality is grown upon a large scale. The cigar and cigarette-making industry is a soundly established and well-organized entity and has its chief impulse in the fierce competition that has developed between the many manufacturers. Modern machinery is installed in the larger plants, which are in the cities, of course, and cigarettes, in particular, have the benefit of the commonly known devices for quick sorting, rolling, sealing and packeting. Almost all of these are of American origin. The cigarette paper, of poor quality, is made in Barcelona, Spain, and is controlled as a monopoly. Only the fancier brands of foreign cigarettes are on sale in the country, the native product having vastly the greater proportion of consumption. One of the chief American tobacco interests recently acquired control of the principal cigarette factories in Caracas.

Several large breweries, a national cement factory, furniture and wood-working plants, marble quarries and cutting establishments and divers industries for the manufacture of soap and candles, glass, ice, matches and cotton-seed oil are maintained within the area of "Industrial Venezuela," and all of these are natural markets for up-to-date machinery.

Labor in Venezuela occupies a wholly different status from that in this country. Instinctively and fundamentally the Venezuelan workman inclines towards mechanics, and, as a rule, he is skillful—in many instances uncannily so. He invariably proves himself to be capable, after a brief instruction, of handling and repairing all sorts of machinery and tools. The wage levels are about sixty-five per cent of those prevailing in this country, except for the completely unskilled and then they are very much lower, depending, of course, upon the locality. At interior points from 60 to 90 cents per day is considered a good wage. The supply of both skilled and unskilled labor, however, is limited and as the Venezuelan industries increase in extent and operation and draw more and more upon the relatively small proportion of workmen to the population, the question of labor-saving and speeding-up devices and machinery, which hitherto has not been a factor because of cheapness and abundance of help for industry operating upon a restricted scale, must come to the fore as a subject for careful consideration for the Venezuelan industrial employer.

Does Big Business Tend to Retard Progress?

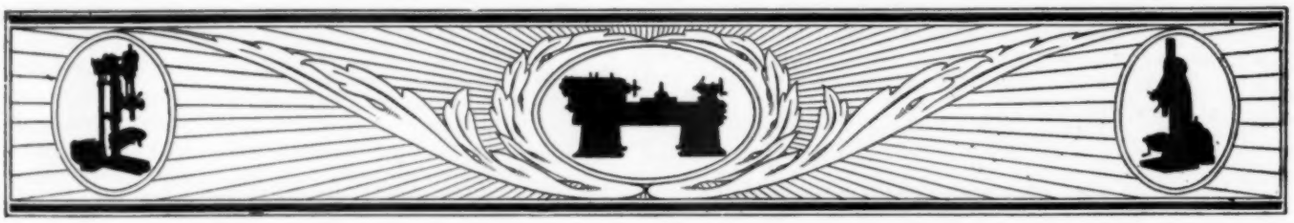
By Harry Senior

Anent the editorial on page 187 of American Machinist in respect to the semi-humorous charge brought by Charles Kettering against the automobile manufacturers, it seems to me that your solicitude lest the same charge might be brought against machinery manufacturers is without foundation, for Mr. Kettering's charge is in itself contradictory.

If the manufacturers of automobiles did *not* make better machines from year to year why do we continue to trade in our cars? There is a reason for all things, and those of us at least who are mechanics, are not altogether the victims of the salesmen's wiles. We turn in our old cars for the purpose of getting better ones, and not often do we get stung.

There may be a slight modicum of truth in your last paragraph, quoting Mr. Kettering, that big business militates against changes, but in times like these the condition does not hold. I am fairly well acquainted with the machine and tool industry throughout New England, and never have I seen a time when so many changes were being made and so thorough and determined efforts toward improvement put forth as at present.

The resumption of business will soon dispel any suspicion we may have entertained that the limit of improvement has been reached.



Two Special Machines for Ordinary Work

Comparatively Small Machine Does the Work of a Large Planer—Work Remains Stationary While Tools Move—Combination Milling and Boring Machine

BY MILTON WRIGHT

THE two special machines herewith illustrated and described, though unique in design, cannot be considered special purpose machines for the reason that they were built to accomplish results regularly obtained on standard planing, boring and milling machines. Nor did their designer seek to upset present-day machine-shop practice by building such machines for the market; rather was he concerned in making for

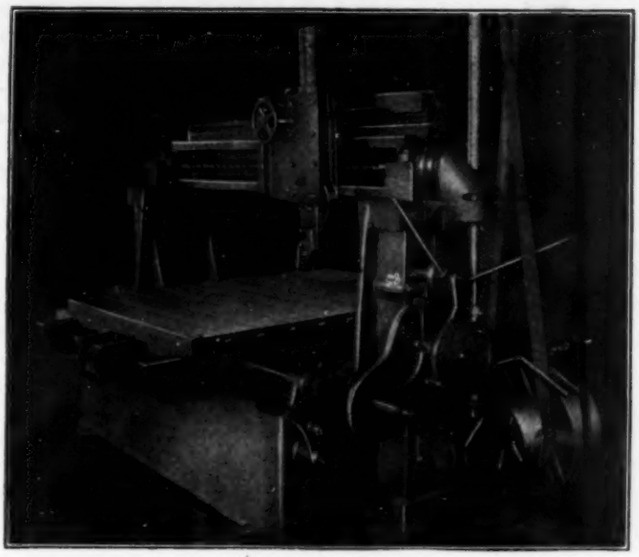


FIG. 1. A PLANER OF UNIQUE DESIGN

his own use something that would modify or remove the restrictions imposed b ymachines of standard construction in the manufacture of his own product.

The machines were designed by F. H. Sleeper, of the Sleeper & Hartley Co., Worcester, Mass., built in the shop of that firm, and are in regular daily service performing operations within the range of each upon the parts of spring coiling machinery.

The machine shown in Fig. 1 is a planer, incorporating all the regular movements and adjustments of a standard planer but in which the cutting movement, instead of being accomplished by sliding the work back and forth under a stationary tool, is by reciprocation of the head, or saddle, along the crossrail, while the table is fed intermittently by means of a screw, ratchet and pawl. The capacity of the machine is 4 ft. in each of its three dimensions.

The crossrail is of unusually heavy construction with substantial square section ways upon which the saddle slides, and the latter has a comparatively long bearing upon the rail and is strongly gibbed to it. Movement is imparted to the saddle by a quick-pitch, triple-thread screw, driven through bevel gearing from the first shaft, which in turn derives its motion from a pair of open and crossed shifting belts. The stroke of the saddle is adjustable from ¾ in. to the full limit of 4 ft., and to any position along the rail. The stroke adjustment is by means of movable dogs on a dial located at the operating position and is at all times within easy reach of the operator regardless of the position of the saddle on the rail.

The crossrail is supported on trunnion bearings and may be swung to an angle of 45 deg. either side of the vertical position; the trunnion nearest the operator being graduated to facilitate the setting. The trunnion bearings are in turn borne by the inner members of "telescoping" housings, by means of which the rail may be elevated to give the full clearance of 4 ft. under the tool. The rail is shown in Fig. 1 at its lowest position.

The toolbar has a vertical movement of 12 in. within the saddle, and is operated by a handwheel and worm gearing. Power down feed is applied by a ratchet and pawl to which motion is transmitted by an adjustable cam on the crossrail.

The table is supported on three flat ways, the center one of which is double, and to it the table is gibbed. This central way guides the table and takes the thrust of the tool; the office of the outer ways is merely to support the weight of table and work.

The table may be fed in either direction by means of a screw lying between the two parts of the center guideway and driven by a ratchet and pawl.

A closer view of the operating position is shown in Fig. 2, from which the details of the drive and control may be studied.

Near the lower end of the vertical shaft is a worm that meshes with a worm wheel in the middle of a short transverse shaft. This latter shaft carries upon its outer end the disk on which are the movable dogs of the reversing mechanism, and upon its inner end the first of a train of gears that transmit motion to the feed screw. This shaft, then, makes a partial rotation, forward and back, at each cycle of movement. The amplitude of the movement, the point of reversal, and

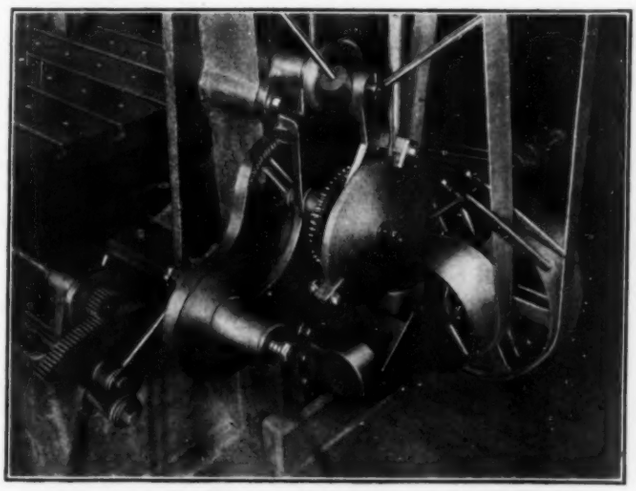


FIG. 2. DETAILS OF THE DRIVE AND CONTROL

the position of the saddle on the crossrail are thus determined by the position of the dogs on the disk.

The gear on the inner end of the transverse shaft drives a friction box similar in construction to that of

a standard planer, and this in turn oscillates the gear segment at the left; the amplitude and relative direction of the movement being determined by the position of an adjustable crankpin with relation to the center of rotation of the friction box. The pinion driven by the gear segment is connected to its shaft through a double ratchet and reversing pawl; by means of which the feed is applied in either direction or is disengaged.

The swinging lever operating the belts is provided with two handles by means of which the traversing movement of the tool is controlled by hand. This movement may thus be stopped, started, or reversed as

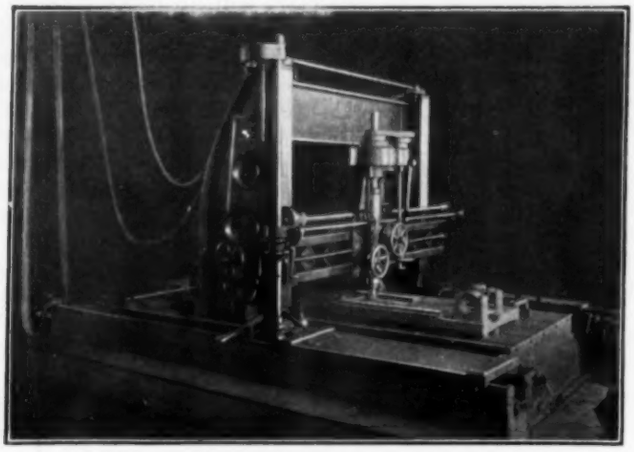


FIG. 3. COMBINATION DRILLING AND MILLING MACHINE

easily and accurately as the corresponding movement of a planer table, either from the operating position or from the back of the machine.

Power for elevating the crossrail is supplied by a separate electric motor located on the outside of the farther housing. To make this adjustment it is necessary for the operator to loosen several clamping bolts on both housings and he would, therefore, naturally be upon the opposite side of the machine when the power was required. What would thus seem at first glance to be a chance disposition of a motor control in an out-of-the-way place is really the result of careful motion study upon the part of the designer.

While this machine would be considered by the casual observer to be a freak, a survey of the conditions which brought it into being would show it to be a logical and practical development. The frames of the spring-coiling machine are made up of long castings that in the larger sizes run into considerable weight. Practically no planing is required over their length, and to plane them widthwise would necessitate the use of a standard planer whose width between housings would be out of all proportion to the job, or else would require the use of long overhanging tools. On this machine there is no restriction as to the length that can be accommodated, and the general handiness and ease of control compare favorably with those of a shaper that would possess but a fraction of its capacity.

The second machine to be considered is by the same designer and is at work in the same shop. It is called a combination milling and boring machine and has even greater range and versatility than the planer. As may be seen in Fig. 3, it resembles in general appearance a standard planer, but differs materially in two respects. Instead of the saddle and toolslide of a planer, the crossrail carries a head similar to that of a radial drilling machine; and it is the housings that move—not the platen.

The platen, or table, is the finished upper surface of the bed casting. It is 4 x 8 ft. in dimension and is provided with T-slots and holes for poppets like a planer platen. The distance between housings is 6 ft. and the maximum height from the table to the lower end of the spindle is 4 ft. The housings may be moved from end to end of the machine. The vertical movement of the spindle is 15 in., independent of the power-driven vertical movement of the crossrail.

With this machine it is possible to secure a casting to the surface of the table and perform any machining operation that can be done with a milling cutter on all of the five exposed surfaces without resetting.

The part shown on the table in Fig. 3 is a special job and will have to be reset to bore the two bearings to be seen at the right, for the machine will not bore holes parallel with the table. All other operations have been completed, including the "letting in" of the caps, drilling and tapping for the cap bolts and finishing a dovetailed slide.

A pit at the end of the machine provides for long pieces that require machining on the ends. The housings over-run the slides a sufficient distance to enable the operator to bring the drills or cutter into action in this position.

The machine has two complete sets of movements; one a slow and powerful drive to the tools and feeds with ample provision for speed and feed changes; the other a rapid traverse of all parts for the purpose of bringing the tools quickly into operating position at any part of the work. The rapid movement derives its power from an auxiliary motor and is independent of the speed and feed changing devices, a reversing switch for this motor being mounted on the housing.

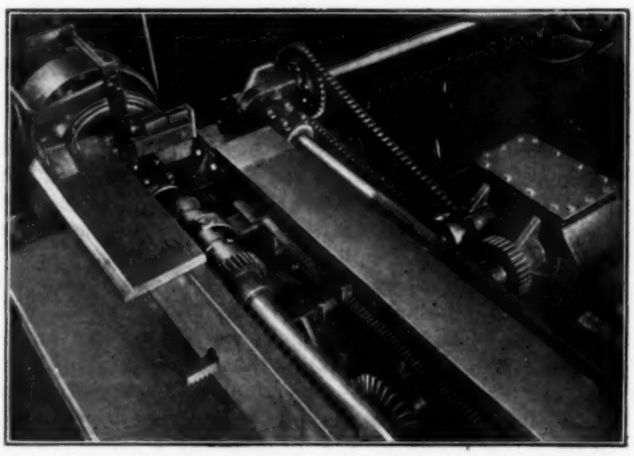


FIG. 4. MAIN DRIVE AND SPEED CHANGE GEARBOX

In Fig. 4 may be seen a portion of the driving mechanism, from which the cover has been removed. The main drive is by belt from an overhead countershaft to the pulley at the left. The main clutch by which all movements may be disengaged or reversed is shown, as is also one of the pair of bevel gears by which the motion is transmitted to the gear box at the right. The auxiliary motor drives through the chain directly to the gear box, but the change gears therein are not involved in the rapid movements, as a sliding clutch puts the gear box out of action before the power can be applied.

Standardizing the Laws Affecting Foreign Trade

By A. J. Wolfe
Chief, Division of Commercial Laws, Department of Commerce

The lack of uniformity in the laws of the various countries which appear as factors in the international exchange of goods is felt as a serious drawback by merchants and jurists everywhere. Standardization is naturally a work of slow growth; it is the inevitable effect of evolution in international merchandising. The time may never be reached, of course, when all countries will adopt commercial codes of substantially identical tenor. Local conditions, the weight of tradition, and radical divergence in the development of jurisprudence preclude this. But there is no reason apparent why international agreement should not establish a certain amount of uniformity in the treatment of various instruments of foreign commerce, such as bills of lading, in regulating bankruptcy practice, in arbitrating commercial disputes, in affording recognition to foreign judgments, in settling the difficult problem of double taxation, in standardizing patent, trade-mark, and copyright laws, and in regulating the status of alien corporations. A limited degree of such standardization has been attained by certain groups of countries, and the tendency is toward further progress along these lines.

Recognition of Foreign Judgments

In this connection the deliberations of the International Law Association at The Hague in the early part of September, as reported in the European press, are of sufficient importance for a brief review in *Commerce Reports* and deserve a close study by American business men, jurists, and economists.

The recognition of the effects of foreign judgments was discussed in a paper prepared jointly by Prof. J. Kosters, Judge of the Supreme Court of the Netherlands, and by Prof. Suyling, of the University of Utrecht. The aim of the report was to present a practical solution of this difficult subject by a draft of a collective treaty. The eminent Dutch jurists pointed out the great divergence of juridical effects of recognizing foreign judgments. In England and in the United States the execution of foreign judgments not being permitted, it is necessary to start fresh proceedings before domestic courts, though the existence of a foreign judgment is regarded as prima facie evidence of the basis of a new claim. Suits brought on this basis, the paper states, are generally successful. New litigation, however, is avoided in a number of states which have regulated the practice of affording recognition to foreign judgments on the basis of reciprocal treaties.

The relators proposed a collective treaty for the elimination of the difficulties hindering the execution of foreign judgments where the rights of all parties concerned have been properly safeguarded. This can be done, of course, only on the assumption that a foreign court deserves full confidence and that its decision should be in principle respected by all states. The report advocated the establishment of an International Court for the execution of foreign judgments.

An International Court of Appeals was proposed by another relator, who brought out the fact that merchants everywhere desire stability in the interpretation of existing rules and customs, certainty of obtaining justice against a debtor and equity at the hands of the creditor, and simplification of the formalities of contracts. The relator commended all endeavors which have been put forth for the attainment of uniformity in mercantile and maritime laws and urged the adoption of a common law on subjects of common interest. This, of course, the relator pointed out, requires a common interpretation by national courts. This can be obtained by international agreement, and further requires the granting to the successful litigant of an exequatur by the authorities of the country where the judgment is to be executed.

A court of appeals in the matter of international agreements, conventions, and common litigation, with appellate jurisdiction from national courts in matters covered by such agreements, conventions, and legislation, was proposed as the solution of the problem.

Another relator went into the subject of standard contracts and of arbitration. Two important groups of contracts which are internationally regulated were used as a basis of the discussion. Both of these groups concern the grain trade. The London Corn Trade Association regulates international sales in the grain trade; the German-Dutch group is concerned more especially with the sales from Baltic and Russian grain areas. The London group publishes contract forms for all varieties of products within its scope of activity. Oil seeds, cotton, copra, and rubber are similarly dealt with by respective associations. Traders merely agree on the choice of contract and fill in details. Sometimes they simplify matters by exchanging contract notes, basing same on "contract form No. —." This provides an easy inclusion of an elaborate total of conditions regulating the contractual relation in all details. The full extent of the c.i.f. clause is covered in the clause interpretation, and it can be positively understood by parties to the contract that, for instance, the perils of the sea are on buyer's account.

Arbitration is inseparably bound up with contracts and conditions, but the relator pointed out the lack of a judge to apply the special law. Customary clauses of sale should be regulated by international agreement. This is particularly desirable in f.o.b. sales.

Of great interest to American business men is a report by Prof. Suyling, of Utrecht, on the subject of double income taxation in Great Britain and the Netherlands, which brings out points of view of value in considering the taxation problems of Americans with foreign sources of income. The relator pointed out that the right of taxing income on account of the place of its origin is exercised in some countries with more discretion than in others. As long as the laws of various states declare incomes taxable either on account of the place of origin or on account of the residence of the recipient, profits are exposed to the risk of being taxed in more than one country. The plurality of the factors upon which states base their taxing power must necessarily lead to double taxation when the person receiving the income resides out of the country where the profits accrue. To avoid this the states would have to base their taxing power on one and the same set of facts. If residence were the only factor, double taxation would be avoided. But it appears clear that the states are not disposed to give up their right to tax income on the several grounds which they regard as decisive, with the result that double taxation is now an unavoidable consequence of a system which, for the time being, is not likely to be changed.

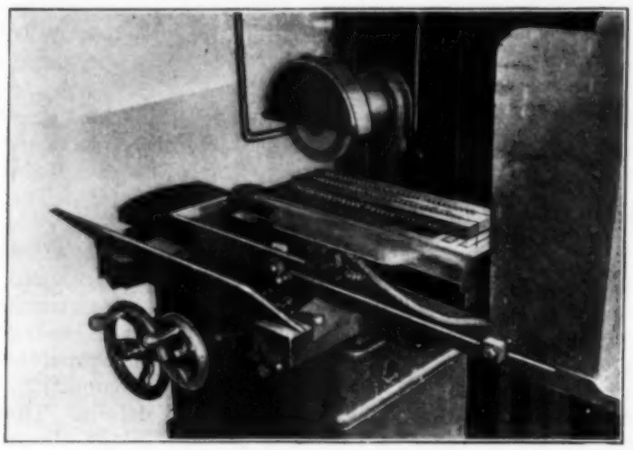
Ideas From Practical Men

Devoted to the exchange of information on useful methods. Its scope includes all divisions of the machine building industry, from drafting room to shipping platform. The articles are made up from letters submitted from all over the world. Descriptions of methods or devices that have proved their value are carefully considered and those published are paid for.

Jig for Grinding the Ends of Small Round Pins

BY AMOS FERBER

A jig for holding small round pins in a vertical position for grinding to exact length, is shown in the accompanying illustration. The ends of the pins must



JIG FOR HOLDING SMALL PINS TO GRIND THE ENDS

be exactly square with the axis and the tolerance with respect to length is very small; but 0.0005 in. plus or minus being allowed.

The central feature of the jig is a steel bar ground accurately square and having thirty V-shaped grooves across each edge. The side pieces, though permanently fastened to the central bar, are merely to provide means for holding the pins in the grooves and are not depended upon in any way to locate them.

To load the jig it is placed upon the magnetic chuck resting upon two thin parallel strips that allow the pins to project far enough so that on grinding the reverse side of the wheel will not touch the bar and destroy its accuracy. Current is now turned on the chuck and pins dropped into the grooves until all are full. The holding screws are now set up lightly and each pin tapped with a lead hammer to insure that it is seated on the surface of the chuck; after which the screws are finally tightened.

The first side is ground with the jig still upon the parallel strips but after this side is brought to a finish the strips are removed and the whole set-up is handled thereafter as a single flat piece.

The production is approximately 80 pins per hour.

Handy Locating Device for Milling Machine

BY FRANK H. BAKER

I note on page 79 of AMERICAN MACHINIST that Frank M. Johnson describes a handy locating device to use on the milling machine. I made a similar tool about three years ago, though I use it in a little different manner than that advised by Mr. Johnson.

As I have a lot of die work that requires much buttoning, I find it much easier to do this at the bench. I then place the arbor in the spindle of the milling machine and slip over it a collar that is a nice fit for the button, which must be of the same diameter as the locating buttons. Securing the work to the table of the machine I then adjust the position of the latter by means of the screws until the collar on the arbor will just slide easily over one of the locating buttons on the work.

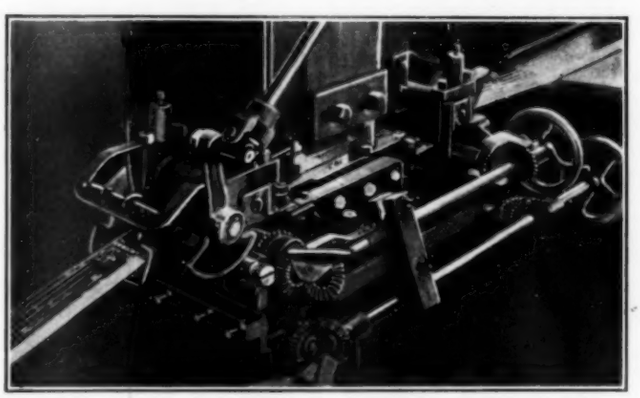
I have also used it without the collar, as described by Mr. Johnson. When the collar is used it is advisable to make it as long if not a little longer than the button.

A Reversing Roll Feed for Blanking Hard Stock

BY MILTON WRIGHT

A double roll press feed that can be made to change the direction of its movement and still maintain its relation to the movement of the punch, is shown in the accompanying illustration. In addition to the change in direction the stock can be moved across the die at each reversal so that unbroken stock is fed to the punch at each stroke of the press.

The reason for making the device with these unusual movements is that the stock is hard steel and the blanks are required to be perfectly straight after



REVERSING ROLL FEED FOR BLANKING HARD STOCK

leaving the die; therefore, the usual method of feeding from a coil and punching successive rows in the same direction is out of the question.

The rolls receive their motion from a ratchet and pawl which is in turn driven from a sliding pin in the yoke at the outer end of the press crank. This yoke is so proportioned as to give an equal amount of throw with the pin on either side of the center.

The roll housings are mounted upon cross-slides gibbed to the frame of the device and, by means of

screws geared to the handwheel, may be moved across the die in unison.

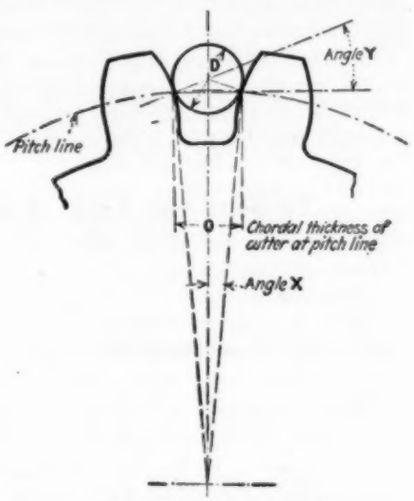
The stock is delivered to the press in flat strips about ten feet long. Starting at one end of a strip the rolls pass the stock along each time the punch is withdrawn until the end is reached, when the operator moves the rolls back a sufficient amount to bring fresh stock under the punch, moves the crankpin to the opposite end of the yoke, and trips the press for the return pass.

Thus the piece strip of stock runs back and forth under the punch, moving a step nearer the press at each pass, until all has been used. The time required to reverse the mechanism is but a few seconds and the production is nearly as rapid as could be obtained by using a coil and winder and transferring the roll of stock from one reel to the other at each pass.

Diameter of Pins for Gear Chucks

By William Owen

The formula given in this article is for the quick and accurate calculation of the diameter of the pins used in chucks for holding spur gears while grinding or reaming the bores. This method is used so that the bore will be absolutely concentric with the pitch line of the gear. The formula takes into consideration the number of teeth in the gear and the pressure angle, both of which affect the diameter of the pins. The solution can not be accurately found by laying the tooth form out on a larger scale. The accompanying illustration shows the construction used for determining the relation between the parts. The meanings of the symbols are: N, number of teeth; P, pressure angle; D, diameter of pin; and O, chordal thickness of cutter at pitch line.



PIN FOR GEAR CHUCK

$$\text{The angle } X = \frac{360}{4N}, \text{ and}$$

$$\text{the angle } Y = X + P$$

$$\text{Then, } D = \frac{O}{\cos Y}$$

As an example, assume an involute gear having a 3-in. pitch diameter, 6 diametrical pitch and a 14½-deg. pressure angle: Find the size of the pins needed in the gear chuck.

$3 \times 6 = 18$ teeth

$$X = \frac{360}{4 \times 18} = 5 \text{ deg.}$$

$Y = 14\frac{1}{2} + 5 = 19\frac{1}{2}$ deg.

$O = 0.2614$ (page 592, *American Machinist Handbook*)

$$D = \frac{0.2614}{0.9426} = 0.2773 \text{ in. diameter of pins.}$$

A Simple Wire Straightening Device

By Charles E. Frank

The illustration herewith shows a very simple and easily made device, for straightening wire from a coil, that can be used in any hollow spindle lathe provided with a drill chuck that has a hole through the shank. It is not intended as a substitute for a commercial wire straightener, but it employs the same principle and may be made up in a very few minutes when needed for an emergency job.

WIRE STRAIGHTENING DEVICE

It consists of a short piece of tubing having an internal diameter somewhat larger than the wire with which it is to be used; the external diameter does not matter so long as it will go in the drill chuck.

The tube is bent as shown in the cut so that the ends will lie in the same parallel line, with a bow of greater or lesser proportions, according to the size and nature of the wire to be straightened, between them. The amount to which the tube must be bowed can best be ascertained by trial.

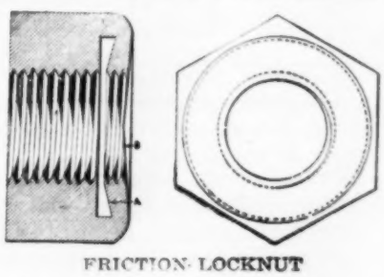
The wire from the coil should be threaded through the lathe spindle and chuck before the tube is gripped in the lathe. The end of the wire can then easily be pushed through the bent tube with a pair of pliers.

The tube is now gripped in the chuck as shown. No support is necessary for the outer end, which, if the tube has been correctly bent, will run true. Start the lathe, which should run not less than 300 r.p.m. and draw out the wire by means of the pliers. If there is sufficient bend in the tube the wire will issue practically straight and any desired length may be drawn out.

A Friction Locknut

By H. D. Chapman

The accompanying sketch shows a locknut that is simple in construction. The sectional view shows how the nut is constructed. A groove A is cut around on the inside of the nut. The top of the nut is then stove in as shown at B, forcing the threads above the slot out of lead with those below. When the nut is screwed on the bolt the threads of the bolt will draw all the threads of the nut in lead and create a friction which locks the nut tight against any vibration.



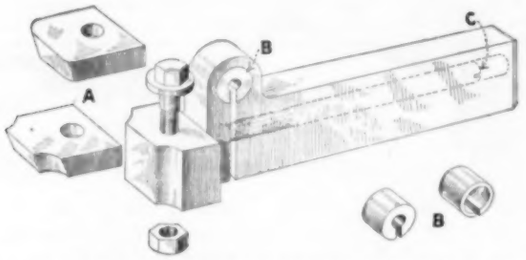
FRICTION LOCKNUT

This nut may be used over and over again without destroying the threads on either nut or bolt.

Handy Gooseneck Toolholder

By W. Wilson

Having had very good success with the toolholder shown herewith, I am passing it along for the benefit of any who may be interested. We use it principally for



GOOSENECK HOLDER FOR RADIUS FORMING TOOLS

a radius tool but of course it can be used for any shape desired.

There are three or four holders kept in the toolroom and a board full of hooks carries the bits or cutting edges in pairs, a concave and a convex bit as shown at *A* constituting a pair, are held together by brass rings. The saving in high-speed steel over the old method of grinding the radius in a solid tool is obvious, but the saving of storage space and sharpening time is also very marked, this being merely a surface job.

Bushings as shown at *B* regulate the amount of spring, depending on the side of radius cut, a large radius, of course, requiring a stiffer gooseneck than a small one.

Screw *C* may be added if desired to make the holder solid, instead of a spring tool.

Increasing Screw Machine Production With a Special Tool Post

By D. A. Nevin

There are instances in almost every hand-screw machine or turret lathe department where it is necessary to use two machines to complete all of the operations on work, because of all the turret holes of the first machine being used, and more than one cross-slide forming operation being required. In the following paragraphs the writer suggests the adoption of a special double toolpost for holding two circular form tools, thus supplying an economical means for increasing production and at the same time releasing a machine for other work.

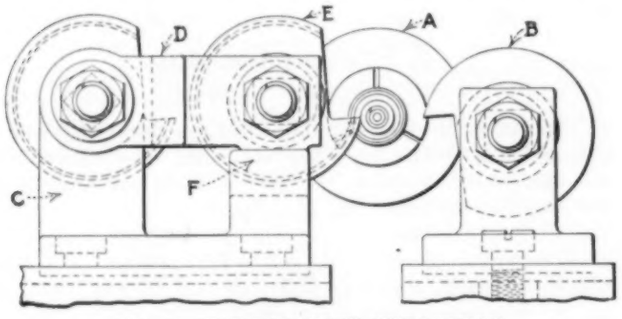


FIG. 1. THE TOOLPOST IN POSITION

In Fig. 1, *A* is the chuck and spindle nose of a hand-screw machine, *B* the rear toolpost and circular cut-off tool. The base of the special toolpost is shown at *C* and supports the offset swinging arm *D*, to which is bolted the circular form tool *E* that is used for the roughing operation.

The arm *D* swings on the bushing shown at *A* in Fig. 2, and rests upon the support *F*, Fig. 1. The bushing *A*, Fig. 2, is sufficiently longer than the thickness of the swinging arm to cause the bolt to clamp the form tool when the nut is tightened. The thickness of the roughing tool is a slide fit between the lugs of the outer support, thus holding the cutter rigid during the cutting operation.

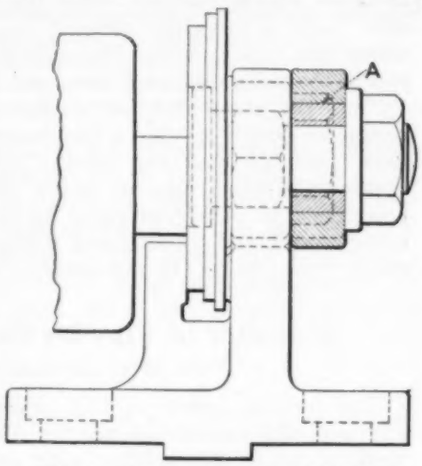


FIG. 2. END VIEW OF TOOLPOST

The toolposts have square holes to suit the shoulders on the clamp bolts; those which the writer used were forged from steel, although in many cases steel or iron castings will be found satisfactory.

To Find the Area of a Crescent

By W. J. Edmonds, Jr.

Let r = radius OA
s = radius PA.
$2m$ = number of degrees in the central angle AOB.
$2n$ = number of degrees in the central angle APB.
π = the ratio of a circumference to its diameter, or 3.1416 nearly.

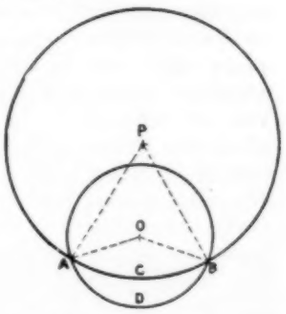


DIAGRAM OF CRESCENT

Then the area S of the crescent $ACBD$ is:

$$S = r^2\left(\frac{m\pi}{180} - \frac{1}{2}\sin 2m\right) - s^2\left(\frac{n\pi}{180} - \frac{1}{2}\sin 2n\right)$$

Chatter in Milling Machines

By Fred A. Parsons

Referring to articles by P. V. Vernon and Elam Whitney, which appeared under the above title on pages 386 and 774, Vol. 55, of the American Machinist, the writer contends that the cause of chatter in milling machines mentioned by those gentlemen is quite well known and recognized at our plant.

It is a part of the standard practice of the demonstrators employed by the Kempsmith Manufacturing Co. to look for the cause of chatter referred to in the above articles when other indications fail.

The method of curing the chatter is one of the many things about a machine shop which, as Mr. Vernon states, is "common practice" with the operators, but comparatively unknown to the men higher up unless they have worked in the shop and absorbed them.

Boring Deep Holes in the Lathe

By J. W. Hertner

The article on "Tool Engineering," page 67 of American Machinist, contains some very interesting data on the use of boring tools in the turret lathe. I wonder how many lathe operators there are, who have not at some time or other been troubled by the clogging and digging in of the tool because of chips that work in between the walls of the hole and the boring bar.

With the cutting tool ground in the usual manner, the tendency of the chips is to fall behind it and thus to be in position to crowd into the narrow space. If the hole ahead of the tool is a cored one, the rough and uneven walls aggravate this tendency and often such a hole will be as bad, if not worse, after being bored than before.

The writer has found that a good way to overcome this tendency of the chips to crowd the bar is to grind the tool with a rake that will cause the chips to fall ahead of the tool, or between it and the chuck. With the cutter ground in this manner it is a simple matter to bore a short distance into the work until the size is established, then run the cross-slide back until the point of the tool clears the walls of the rough hole and traverse the carriage to bring the cutting tool to the inner end of the work.

Before running the cross-slide back, its position should be noted by means of the micrometer dial on the crossfeed screw. Returning the tool to cutting position by means of this mark, the reverse feed is thrown in and, with the tool feeding toward the tailstock, the chips will fall behind the cutting point and will come out between the work and the chuck, leaving none to crowd in between the bar and the walls of the hole.

Milling Machine Dynamometer—Discussion

By John Airey

I read with interest an article entitled "Milling Machine Dynamometer," on page 148 of American Machinist. Mr. Poliakoff's device is essentially for commercial testing. The apparatus used by Mr. Oxford and myself is exclusively a research endeavor and has not been suggested by us as desirable for other fields. Mr. Poliakoff's comparison is therefore unfortunate as it distorts one's perspective of the real scope of each apparatus.

The third piston used in the writer's instrument was not used (as apparently Mr. Poliakoff believes) because of the table travel, as this piston would be equally necessary if the table did *not* move. The object of the investigation was fully to determine the force exerted by the cutter. This involved the determination of three quantities—*magnitude, direction* and *location*. It is no more possible to do this with only two measuring devices than it is possible to solve for three unknowns by means of two equations, and this irrespective of table travel.

The dynamometer shown in Fig. 1, page 148, cannot possibly give data from which the driving torque can be obtained. Emphasis on this statement is equally legitimate as is the condemnation of perpetual motion. The dynamometer in question will give horizontal force, after an allowance is made for friction, but I doubt its ability to give vertical force due to the unknown influence of a couple caused by the horizontal forces. This couple influence might be compensated for in the computation but not in an entirely satisfactory manner.

The later dynamometer designed by Mr. Poliakoff and marketed by the Cincinnati Milling Machine Co. (described on page 114, Vol. 55, American Machinist) has a useful sphere of action in comparing horizontal and vertical forces. Even this instrument does not, however, enable the experimenter to find the location of the resultant force, i.e., its perpendicular distance from the spindle; hence the power is indeterminate.

The description on page 114 is inferentially misleading, in that it condemns the crudeness of the method in which motor input is measured. This instrument cannot measure power but the features it does measure throw considerable light on the action of a cutter from the standpoint of jig and fixture design.

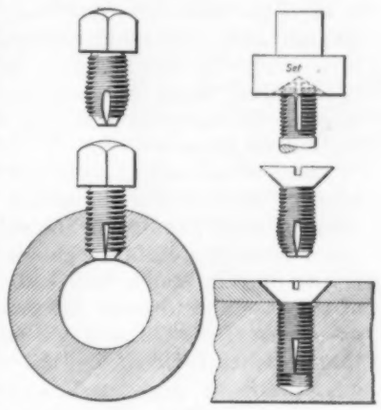
There is a crude proportional connection between end thrust and power consumed (equivalent to assuming constant lever arm of force from spindle), but it would not be research if this assumption were made.

Self-Locking Screws

By H. D. Chapman

The illustration shows the manner in which I have prepared screws to keep them from jarring loose when in parts that are subject to vibration.

A saw cut is made in the end of the screw which is then upset slightly by the use of the tool shown, closing the split ends together and causing the body of the screw to bulge slightly. This expansion of the screw should not be more than 0.025 inch. The friction of the screw against the sides of the hole will prevent it from coming loose. I have used screws prepared in this way in pulleys on line shafts and in other places where I had experienced trouble from the ordinary screws. Thus far they have remained tight.



SELF-LOCKING SCREW

Kink in Cutting Left-Hand Threads

By Arthur F. Parker

The writer had occasion to thread a number of gate valve stems ¾ in. in diameter, Acme double thread, 6 pitch, left-hand.

A neck from which to start the thread would have been impractical because of the weakening effect upon the stem, and as the threads had to start from a shoulder it would have been a slow and tedious job to start each cut in solid stock.

As an experiment I placed the toolpost back of the center line and ran the lathe backward, starting each cut from the tailstock end as would be done in right-hand threading. The lathe was equipped with a thread dial so that the carriage could be unlocked and run back by hand. The job was finished in a surprisingly short time.

A word of caution to anyone who tries this scheme: Make sure that the faceplate is on tight.

EDITORIALS

Jobs or Bonus?

ONE thing which seems to be lost to the sight of those advocating a cash bonus for World War veterans, is that the giving of a relatively small amount of cash to each ex-service man may result in keeping many thousands out of work indefinitely. Evidence is piling up from every side that a bonus bill which would saddle the country with four or five billions of additional debt, would have a very serious effect on our slowly reviving business. Any retardation of business revival would cost the majority of bonus beneficiaries far more than they would receive from the Government in bonus payments. As for the rest of us—but bonus advocates seem to have thought very little of us.

We cannot but sympathize with the feeling of many veterans who remember the various and sundry kinds of profiteering practiced by men in all walks of life who stayed at home. But is a cash bonus the best way to even the balance? Are many months without work, revenge and a five-hundred-dollar bonus to be preferred to a job? Of course there are, unfortunately, many unemployed, some of them ex-service men, but their chances of employment will be much better if no bonus legislation is passed.

There is no need to comment here on the sordid features of the fight for the bonus. That part of the movement is being handled on the editorial pages of the daily press much more ably than we could treat it. We are trying only to take a practical view of the probabilities of the case and to point out that for the majority of the ex-service men a bonus would be far more of a hindrance than a help. Incidentally, the writer of this editorial is an ex-service man and a former member of the American Legion.

The Dangerous Dirigible

THE wreck of the Roma, following so closely that of the R-38, calls attention once more to the dangers of the lighter than air machine at the present stage of development. The wreck of the R-38, according to the latest reports, was directly due to faulty design, little or no allowance having been made for the stresses set up while in flight. In both cases the gas caught fire and added to the horrors of the disaster.

These disasters emphasize, more than any argument could, the comparative cost and safety of the heavier-than-air craft. The cost of either the wreck of the Roma or the R-38 is far greater, both in casualties and cost, than the total for the air mail since its inception in 1917. The high cost of the units involved, and the dangers of disaster which still exist, make it clear that we can afford to spend more on airplanes, if not less on dirigibles.

The air mail has a record of completing 98 per cent of its scheduled trips, flying over 400,000 miles in three months, with no loss of life in service and only one on a "ferry" trip. Since the beginning of the Air Mail Service in 1917, the mail pilots have flown 3,400,000 miles with a total loss of thirty lives, of which seventeen occurred in 1920. The casualties for 1921 were remarkably small.

While we cannot neglect the dirigible entirely, as development work must be done in order to learn its possibilities, there can be no question as to the advisability of continuing the air mail as a practical method of developing the airplane. Our Air Mail Service is the standard of the world—can we afford to relinquish this position?

The Patent Office Gets Relief

AFTER months of strenuous effort to overcome opposition of the most baffling kind, the supporters of the movement for the relief of the United States Patent Office have won a measure of success. Congress has passed the Lampert Patent Office Bill and President Harding signed it on Feb. 18.

Just why there should be opposition to the movement to put the Patent Office on a modern business basis is hard to fathom. The Patent Office has always paid its own way and will continue to do so under the new law. Efficiency in this division of the administration of the Government is absolutely essential to our industrial well-being. It is unnecessary to remind the men of the machinery industry of this obvious fact, but in doing so we hope that they will make it a point to do their part in educating the rest of the country to a realization of what a smooth-running patent office means.

Our national inventive genius has been one of the strongest factors to keep us in the race for industrial supremacy. Reduce the incentive to inventors and the whole industrial structure will be in danger of collapse. Remember that things do not stand still on this earth of ours; they either progress or they decay. We can't afford to stop progressing.

The Business Outlook Is Brighter

WITHOUT undue optimism of the sort which claims to see daylight before dawn, we can safely say that business is on the mend. There is no boom in sight, and we should be thankful for it. But even the most pessimistic must admit a real improvement in actual business, as well as in the general feeling toward the future.

A study of the list of shops which are reopening after more or less protracted closure cannot fail to be encouraging. And the fact that these are not in any special line or particular locality makes it all the better. Railroad shops in Delaware, in Pennsylvania, New York and in Texas; automobile shops in various cities, shops manufacturing stoves, axes, taps and dies, structural steel, tubing and other products all report increases in output, more men employed or longer hours worked.

The sooner we all realize that resumption is actually on the way, and do our part toward placing orders, even if small, the sooner we shall see a more marked improvement in every line. Every little helps and we can all do that little. Why not do it now?

Shop Equipment News

Cincinnati Automotive-Parts Grinding Machine

A grinding machine especially adapted to handling the parts of internal-combustion engines has recently been brought out by the Cincinnati Grinder Co., Cincinnati, Ohio. It is intended for operation on crankshaft bearings, valve seats and stems, piston rings, pins and push rods. In addition, it is capable of handling many other parts used on automobiles, motor trucks and such machines. The machine is made in two styles, one for power feed and the other for hand feed. It can be furnished for either belt or motor drive.

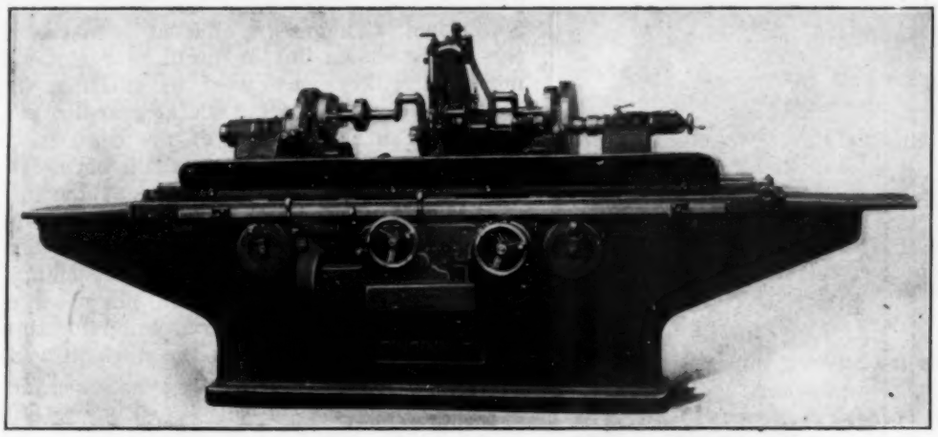


FIG. 1. CINCINNATI POWER-FEED AUTOMOTIVE-PARTS GRINDING MACHINE

The power-feed machine, shown in Fig. 1, provides power traverse and automatic reverse to the table, and automatic in-feed to the grinding wheel. The hand-feed machine, while the same in design as the power-feed machine, is not provided with the units giving the power traverse and automatic features. However, a fast and a slow hand traverse movement are provided for the table, the slow movement being of particular use in truing the wheel.

The grinding wheel ordinarily employed is 24 in. in diameter, has 1½-in. face and a 12-in. hole. The necessary mounting and guard are provided for the wheel, as well as a wheel-truing fixture for both the side and the face. A simplified type of overhead countershaft is also furnished, when direct motor drive is not employed. Two back rests with wooden shoes and two crankheads are furnished. For holding flanged-end cranks, two adaptors are provided. A universal piston holding and driving fixture is also furnished.

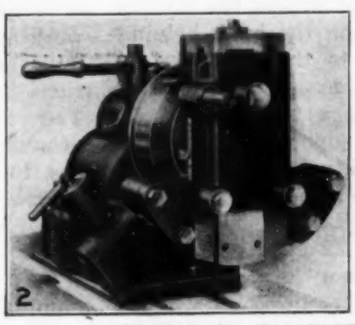
To permit of plain cylindrical grinding, footstock and headstock centers, a driving plate and three sizes of driving dogs can be provided. A number of additional attachments have been developed for handling special work. Thus, such fixtures as a valve-seat grinding attachment, a radius truing device and an internal grinding fixture for motorcycle cylinders may be applied.

The sliding table is of heavy construction, and is equipped with cross girts of I-section. The base has a box section that is thoroughly ribbed and braced, so as to resist torsion and twisting strains. The water tank and the wheelslide pedestal are cast integral with the bed. The base has a three-point bearing on the floor or foundation, thus assisting it to remain in alignment.

The machine is manufactured on the unit system, so as to provide accessibility. The method of manufacture provides for interchangeability of parts, so that worn or broken ones may be easily replaced. All sliding and revolving parts are provided with means of lubrication and are readily accessible.

The machine provides a swing over the table of 17 in. The maximum distance between the centers is 72 in., although with both the workhead and the footstock overhung, 78 in. may be obtained. The machine requires 7 hp. for driving. The floor space occupied is 58 x 226 in. The weight of the machine is 8,030 lb. when equipped with power feed, and 6,600 lb. when equipped for hand feed. The weights for domestic shipment are, respectively, 9,130 lb. and 7,700 lb.; for foreign shipment, the weights are 10,130 lb. and 8,700 lb. The contents of the export box are 240 cubic feet.

In Fig. 2 the crankhead for the headstock is shown. It is possible by the use of the head to handle with equal effectiveness and speed all sizes of crankshafts, whether of short or long stroke. The crankshaft may be easily placed in the machine, and the pin brought to the correct alignment by the use of an indicator. Quick-acting adjustments are provided. It is possible to hold rigidly either plain or flanged cranks.



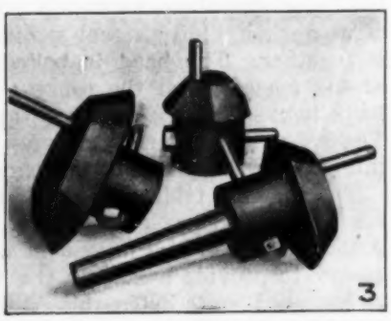
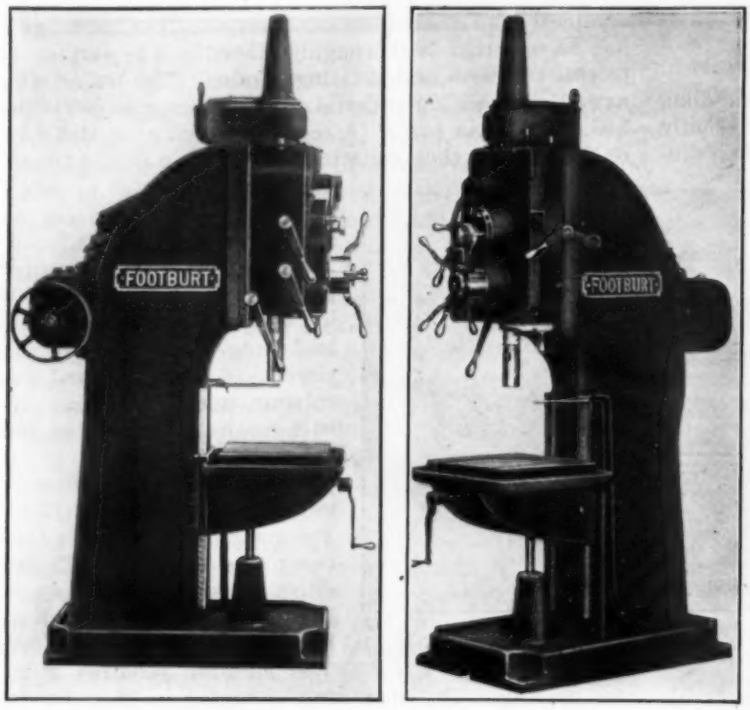


FIG. 2. HEADSTOCK CRANKHEAD. FIG. 3. UNIVERSAL PISTON ATTACHMENTS

In Fig. 3 can be seen the universal piston grinding attachments. It is possible to handle all sizes of pistons with the attachments. The lower end of the piston rests on the conical end of the attachment, and the top of the piston is supported by the center of the tailstock. The device drives the piston by means of a pin.

Foote-Burt 20-in. High-Duty Drilling Machine

The Foote-Burt Co., Cleveland, Ohio, has recently re-designed its No. 23 high-duty drilling machine. The machine has a 20-in. swing and a capacity for driving



FOOTE-BURT NO. 23-20 HIGH-DUTY DRILLING MACHINE

1½-in. diameter drills in steel. The simplicity of the design and the ruggedness of the construction are the principal points to which the maker calls attention.

The view at the left of the accompanying illustration shows the depth through the column at the point of the maximum stress. There is no joint in the upright in the horizontal plane, as such a joint entails the placing of a considerable tensional strain on the bolts holding it together. The head is bolted to the vertical face of the upright, and the construction is such that the bolts have a shearing rather than a tensional stress. The base, upright and jack-screw supports are all cast integral, so as to add to the rigidity of the structure.

The working table is supported by a single telescoping screw, and has a working surface of 20 x 16 in. Although its vertical movement is 22 in., it is not necessary to provide a hole in the floor for the screw.

The machine is driven by a belt running on a single pulley, so that no countershaft is required. A friction clutch is utilized to engage and disengage the drive. The head itself contains all the mechanism for changing the feeds and speeds. The cover of the head is removable, so that the gears may be inspected. When necessary, the complete head can be removed as a unit, thus making all the gears easily accessible. The gears for changing the feeds and speeds are made of heat-treated steel. The speed-change gears run in an oil bath, while the feed gears are lubricated by means of a splash oiling system.

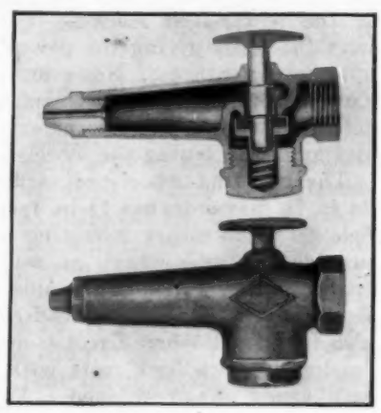
The gears driving the spindle at the top of the head are of the helical type, so as to give a uniform and smooth motion. They are packed in grease with a supply sufficient to last for several months. The spindle is fed by means of a double rack, to eliminate side thrust on the spindle sleeve. A power feed of 12 in. is provided. The maximum distance from the nose of the spindle to the top of the table is 28⅝ in. The bearings in the driving shaft are of the Hyatt type for the carrying of the radial loads, while taper roller bearings serve to absorb the combined radial and thrust loads. A heavy ball thrust bearing is provided on the spindle.

Nine changes of spindle speed are provided. When the driving pulley runs at 500 r.p.m., the speeds range from 75 to 610 r.p.m. Three changes of feed are provided, so as to give feeds of 0.006, 0.012 and 0.026 in. per revolution. Changes are effected by means of the levers shown on the head. No clutches nor sliding keys are used in shifting the speed and feed ratios, but sliding gears are employed. The accessibility of the controls to the operator should be noted, as it is not necessary for him to move to the side of the machine to change either the speeds or the feeds. The mechanism of the head is completely inclosed, including also the top of the spindle when at the height of its travel. The machine is provided with a gear-driven pump for supplying cutting compound to the work through the pipe shown.

Due to its ease of operation and to its rigid construction, the machine should serve for work at high speed and heavy feed where large-scale production is desired. The maker claims that the construction permits of the elimination of a number of parts required in the former model. The weight of the machine is 2,700 pounds when equipped as shown, and without work-holding fixtures or attachments.

Jenkins Air Gun

Jenkins Bros., 80 White St., New York, N. Y., have recently placed on the market a brass air gun adaptable to general use in foundries, machine shops, woodworking and textile mills, electrical stations and garages. The valve, a section of which is shown at the top of the accompanying illustration, holds tight under pressure when closed and eliminates waste of compressed air from leakage. The renewable disk with which it is fitted is cast of steam bronze. It forms a contact on the seat and takes the wear. In case small particles of foreign matter accumulate on the disk and seat, they can be easily and quickly removed. By unscrewing the cap in the lower part of the gun the disk and disk holder can be taken out, rubbed on emery and replaced.



JENKINS AIR GUN

The air gun is made in ¼-in size, and can be used for ⅛-, ¼-, ⅜- and ½-in. hose by the use of different hose nipples.

Reed-Prentice Four-Way Drilling Machine

The Reed-Prentice Co., Worcester, Mass., has recently placed on the market the machine shown in Fig. 1 for drilling simultaneously four holes at right-angles to each other and in the same plane. The machine is adapted to various uses, but was designed primarily for drilling an automobile rear-axle housing, such as shown on the floor in front of the machine. It is intended for large work, since the maximum distance between opposing spindle chucks is 26 in., and the distance from the table to the spindle centers is 6 in.

The four spindles have a maximum travel of 3½ in. each, and are operated simultaneously by a feed mechanism inside the base. The mechanism is engaged by means of a lever at the left of the machine. When the drills cut through the work, the automatic trip releases the feed to the four spindles simultaneously.

The machine is driven by means of a belt running on the pulleys at the right of the machine. The spindles may be advanced to or withdrawn from the work by hand by the use of the large handwheel shown on top of the machine at the left. As the drills become shorter, due to grinding or breakage, the inner spindles may be adjusted longitudinally in the main spindles.

All bearings inside the machine are lubricated by forced feed, while sight-feed oilers are provided for

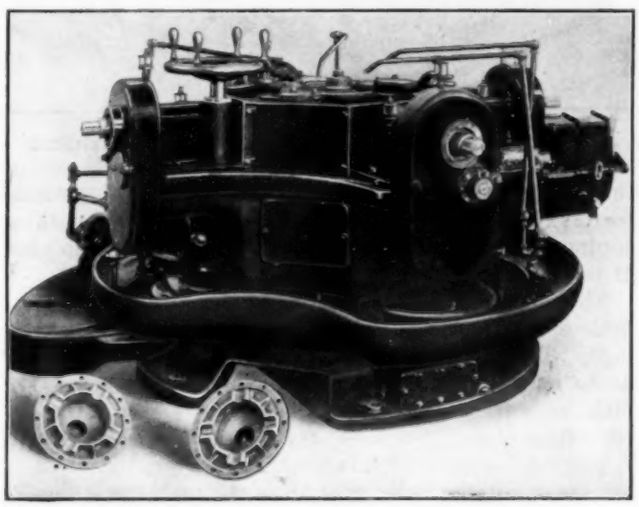


FIG. 1. REED-PRENTICE FOUR-WAY DRILLING MACHINE

the main spindle bearings. Cutting compound is furnished to each drill by a forcing system, the settling tank of which is in the base at the left of the machine. The base is so constructed that the compound flows back readily to the settling tank.

The work-holding fixture, a view of which can be seen in Fig. 2, is intended for rapidly handling the parts. Inside the fixture are four hard steel strips to guide the work and locate it centrally. In the lower part of the fixture are guiding pins, which engage two of the holes in the rim of the housing and locate the work in the proper relation to the drills themselves.

The lower half of the housing to be drilled is first dropped into position, and then the four plungers located between the spindles are forced toward the center by means of the lever on top of the fixture. The upper half of the housing is placed on top of the lower portion. By means of the guide pins on the plungers fitting four holes in the housing flanges, the position of both halves of the housing is maintained. The work is then clamped onto the slabbed portion of the plungers by means of a center bolt through the two housings. The plungers thus support the work during the drilling.

When the holes have been drilled, the upper part of the housing is first removed, and then the four

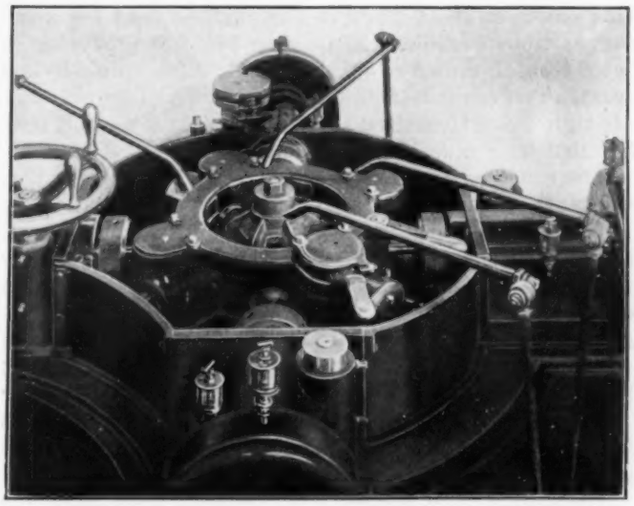


FIG. 2. WORK-HOLDING FIXTURE OF FOUR-WAY MACHINE

plungers are withdrawn, allowing the lower half of the housing to be raised by means of a lever. This lever actuates four vertically operated plungers, so as to bring the lower half of the housing into a position from which it may easily be lifted out of the fixture.

The drills are guided by hardened steel bushings inserted in the body of the fixture. Both accuracy regarding the work and high speed of production are claimed for the machine. All parts are rigidly made, so as to obtain permanent alignment. When desired, a motor drive can be readily incorporated in the machine, the power from the motor being delivered through gearing. The machine has an overall height of 49½ in., while it is 85 in. in width and 96 in. long. It weighs approximately 7,550 pounds.

A machine of somewhat smaller proportions is also made to care for a lighter class of work, such as universal-joint rings and differential spiders. In the former case it drills simultaneously the four holes in a ring, and in the latter it turns the four arms on the crosses. However, it embodies all the features of the large machine just described.

Whitcomb-Blaisdell Planer Arranged for High Speed

The Whitcomb-Blaisdell Machine Tool Co., Worcester, Mass., has recently equipped one of its 26 x 32 x 18-in. planers for operation at a speed of 150 ft. per minute on both cutting and return strokes. The successful maintenance of such a high speed is attributed to the second-belt type of drive, wherein the bull wheel is driven by belt instead of gears.

The bed of the machine is cast in one piece. The table contains T-slots, but no holes, and the steel rack extends for the full length of the table. Thirty-inch driving pulleys and shipper motion are provided. Two heads are mounted on the crossrail, both running on the lower screw. The minimum distance between the tools is 12 inches.

The material planed consists of composition brass screen plates about 13 x 30 in. in size.

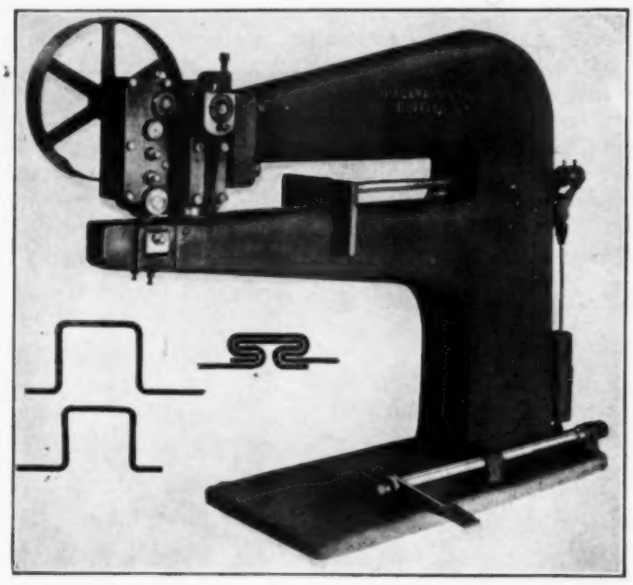
Niagara No. 42 Compound Seam-Closing Machine

The machine shown in the accompanying illustration has recently been placed on the market by the Niagara Machine and Tool Works, Buffalo, N. Y., for closing side seams of sheet-metal drums such as used for holding calcium carbide. It is intended for producing a seam tighter and more substantial than the single-locked seam. The compound-locked seam formed is practically air tight; and if desired to be completely air tight, may be filled with a sealing compound.

The small sectional view at the left of the illustration shows the offsets that are formed in the metal to be joined. This operation is performed in a double-crank press. The sheet is then rolled to the form of a cylinder the size of the drum desired, and is placed over the horn of the seam-closing machine. The offsets fit on the guide piece set in the top of the horn, so as to hold the seam in the proper position, and to guide the work as it passes from the machine.

The machine is driven continuously by means of a belt, and therefore does not require tight and loose pulleys or a clutch. By depressing the treadle connected to the sliding gage, the work is moved forward along the horn and fed between the first set of rolls. These horizontal rolls squeeze the seam together at the bottom, and feed the work automatically through the machine after they have once obtained a grip. The second set of rolls flatten, and thereby close the double-locked seam to the form shown in the small sketch at the center of the illustration. The seam is then completely formed, and the drum is delivered from the press.

The maximum length of work that can be seamed is 42 in., and the minimum diameter of work that can be seamed at this maximum length is 13½ in. On drums of shorter length, smaller diameters can be seamed. The machine is intended for operating on soft steel of 22-gage or lighter. The pulley, which is 20 in. in diameter and has a 3-in. face, is ordinarily run at 100 r.p.m.

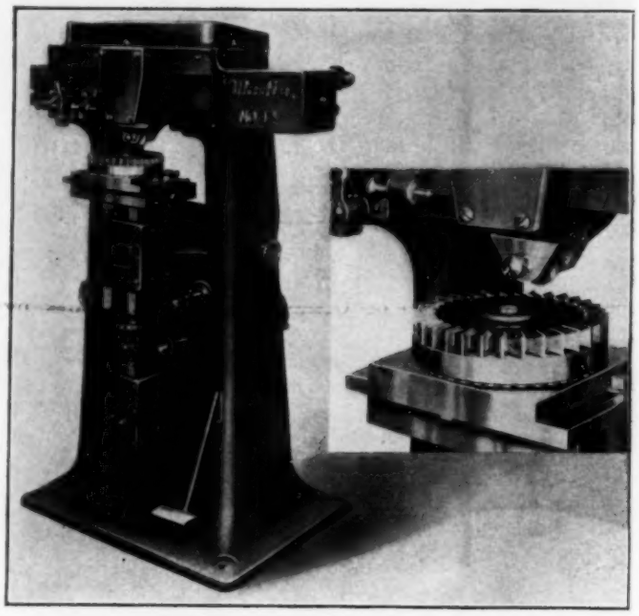


NIAGARA NO. 42 SEAM-CLOSING MACHINE

It should be noted that the base, the column, the horn and the arm carrying the head are cast in one piece, a construction that greatly increases the rigidity. The weight of the machine is approximately 2,700 pounds.

Martin Hydraulic Marking Machine with Circular Table

On page 638, Vol. 48, of AMERICAN MACHINIST, there appeared a description of the No. 12 hydraulic marking machine made by the Martin Machine Co., Inc., Turner Falls, Mass. The machine has recently been equipped for marking work, such as cutters, rings and bearings,



MARTIN MARKING MACHINE WITH CIRCULAR TABLE

that requires an inscription to be placed in circular form. The accompanying illustration shows the machine equipped with the device, and also shows a close-up view of the marking table.

The disk or cutter to be marked is placed on this table or fixture, the top of which revolves on ball bearings. The position of the fixture can be adjusted, so as to mark at any desired radius on the work. The disk or work is ordinarily held in the center of the revolving plate by means of a plug in the center-hole. A plain roll type of die is used. However, the die does not change its position relative to the machine, although it is revolved by means of a rack fastened to the slide of the machine. As the die comes in contact with the work and revolves, it automatically causes the top plate of the fixture, together with the piece, to revolve. No difficulty is encountered in the marking if the pieces vary considerably in thickness.

The machine is driven by a belt on pulleys at the rear, the power being utilized to operate a rotary pump. By means of the pump, oil pressure is maintained for operating both the vertical table that raises the work to the marking die and also the horizontal die-holding slide. In operation, when the treadle is depressed, the work is raised to the operating point, and the die is revolved. As soon as the marking is completed, an adjustable stop on the slide trips the reverse lever, so as to cause the slide, and consequently the die, to return to its starting point and the table to drop back to its original position. The travel of the slide can be adjusted from ¼ to 7 in., and the travel of the table up to 6 in. The machine has a height of 50 in., and requires a floor space of 27 x 22 in. It weighs 1,050 pounds.

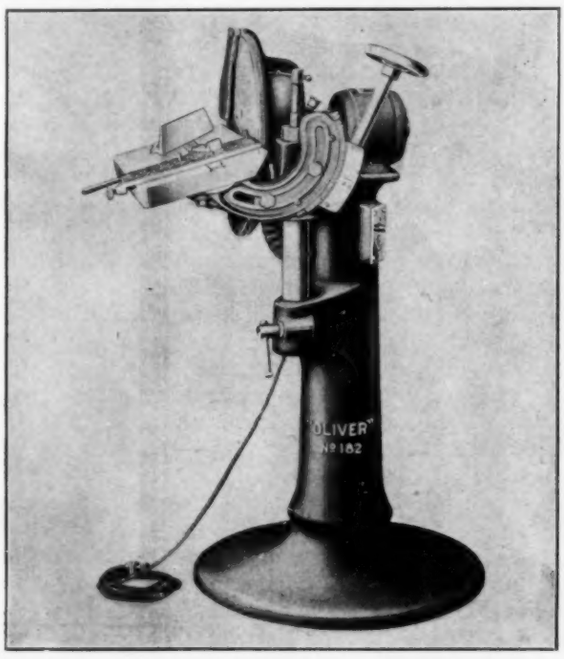
Oliver 15-in. Disk Sanding Machine

The Oliver Machinery Co., Grand Rapids, Mich., has recently brought out the 15-in. disk sanding machine shown in the accompanying illustration. The machine is designed as No. 182, and is intended for accurately sanding such pieces as segments, coreprints and small pieces made in pattern and cabinet work. It can be utilized for sanding circular work up to 15 in. in diameter and duplicating work up to 7 in. wide. When sanding wood, garnet paper disks are employed; and for grinding or polishing metal, aloxite or emery cloth disks are used.

The device is mounted on a heavy cast-iron column equipped with a wide flange to give a solid footing. The disk head mounted on the column contains the disk, the disk shaft, the ball thrust bearing and the exhaust fan. The exhaust system is arranged to deposit the dust within the column. The disk itself is removable for renewing the abrasive paper or cloth. It is run at a speed of 1,725 r.p.m. by means of a ball-bearing electric motor.

The motor may be furnished for either direct or alternating current of 110 or 220 volts. A push-button switch is mounted on the column in a convenient position for the operator. Because of the fact that the motor can be driven from a lighting circuit, an extension cord is provided. In this way, the sanding machine can be moved to the desired position in the shop and connected to a convenient socket.

The table is made of cast iron and is 9¼ in. wide, 21 in. long and 37 in. above the floor. It can be tilted 45 deg. downward, or 25 deg. upward by means of a handwheel, which is so connected through a worm as to be self-locking. A graduated index shows the angle. The table has a vertical adjustment of 6 in., and can be swung to the right to give clearance around the disk.

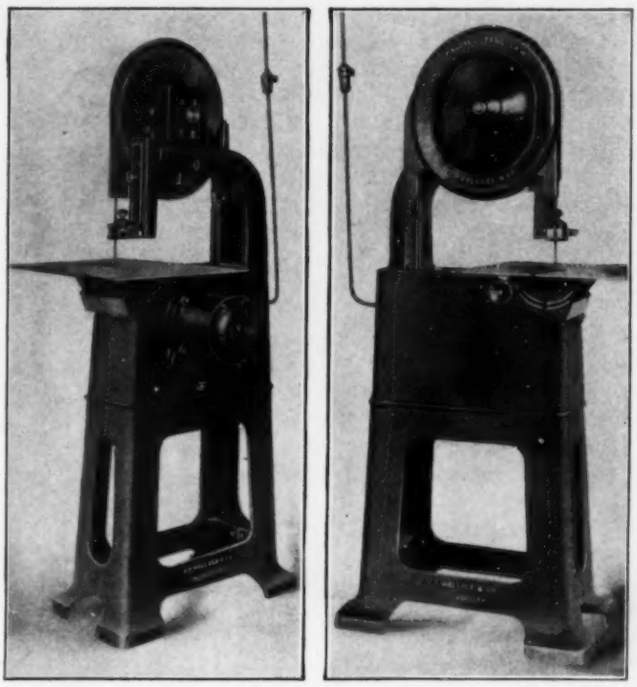


OLIVER 15-IN. DISK SANDING MACHINE

An angle gage can be mounted on the table for cutting work at angles. A circle, segment and duplicating gage is also furnished. The tool should have a wide application for the finishing of small work.

Wallace 16-In. Motor-Driven Bandsaw

J. D. Wallace & Co., 1401 West Jackson Blvd., Chicago, Ill., has just placed on the market a 16-in. motor-driven bandsaw. The machine is intended for general



WALLACE 16-IN. MOTOR-DRIVEN BANDSAW

use in pattern and carpenter shops, and is easily portable. Two views of it are shown in the accompanying illustration. It will be noted in the view on the left that the machine is driven by a totally inclosed motor, mounted on the side of the frame. The motor drives the lower wheel by means of a fabroil gear and steel pinion, both the gear and the pinion running in oil.

The motor is of ½ hp. and the armature runs on ball bearings at a speed of 1,750 r.p.h. It drives the saw at a speed of 3,150 ft. per minute. Because of the fact that the motor can be driven by current taken from an ordinary lighting circuit, it is practicable to move the machine about the shop to the position where it may best handle the work. The portability of the machine is one of its chief features.

The table consists of a ground steel plate 19 x 21 in. in size. It is mounted on a large rocker bearing, so that it may be adjusted in angularity from 45 deg. forward to 5 deg. to the rear. An indicator is provided to show the angle at which the table is tilted. The table may be easily removed.

The machine is equipped throughout with ball bearings. Not only the saw wheels run on them, but the upper and lower guides for the saw are of the ball-bearing type. The saw blade bears on the periphery of the roller. All adjustments on the machine are made by means of handwheels or thumbscrews, so that it is not necessary to have special tools or wrenches in setting up or adjusting.

The wheels carrying the saw are steel disks 16 in. in diameter. The guards are built into the machine and thoroughly protect the disk and the saw. The saw has a maximum capacity for wood 8 in. in thickness. The table is 42 in. above the floor. The machine is 5 ft. 9 in. in height overall, and requires a floor space of 15 x 29 in.

Adriance Machine Works Automatic Stagger-Feed Punch Press

The Adriance Machine Works, Inc., 88 Richards St., Brooklyn, N. Y., has recently placed on the market the stagger-feed press shown in the accompanying illustration. The machine is designated as the No. 564-A press, and is intended primarily for the production of such work as can tops and bottoms, small shells and jar closures. Lithographic designs can be accurately fed, as perfect register is obtainable. The scrap is ejected automatically, and cut into skeleton frames. The automatic operation enables rapidity of production.

Due to the staggered feed arrangement, blanks are punched out with but a thread of metal between them, so as to reduce the amount of waste. There is only one die, so as to save on the initial cost of the set-up and also to save time in making adjustments. The maker calls attention particularly to the simplicity of the construction, and to the fact that fewer parts are used than in former models of the same style of press.

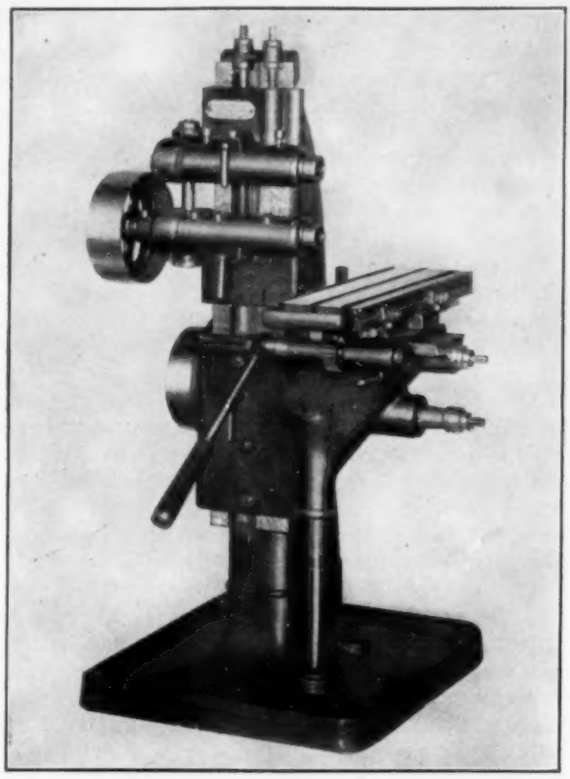
The quantity of work produced depends upon the size of the work, although the maker states that over 100 blanks of from 1 to 4 in. in diameter can be accurately punched out per minute. The speed is obtained very largely by the continuous action of the punch, while the sheet carrier travels in either direction. It is not necessary for this carrier to return to the starting point after punching a row of holes; and as soon as the end of a row is reached, the carrier automatically reverses in direction and the next row is punched out as the carrier returns to the starting point. As soon as the last blank on the sheet has been punched, the carrier stops automatically and ejects the sheet, then being ready to receive a fresh sheet. One operator can ordinarily run several presses, and can obtain a production of over 100,000 blanks a day, the maker states.

The safety of the operator is assured, as it is not necessary for him to place his fingers near the die while the press is running. The inclined position of the press enables the rapid handling of the work both to and from the machine. The arrangement of the parts can be noted in the illustration.

ADRIANCE AUTOMATIC STAGGER-FEED PRESS

Superior Machine and Engineering Co. Duplex Hand-Milling Machine

The Superior Machine and Engineering Co. of Detroit, Mich., has recently placed on the market the duplex hand-milling machine illustrated herewith. The machine is intended for such work as slitting piston rings of the step type, for sawing apart babbitt-lined bearings for automobile crankshafts, and for milling two keyways or slots at the same time. The main features of the machine are the same as those of the single-spindle "Superior" hand-milling machine described on page 1115, Vol. 52, of AMERICAN MACHINIST. The specifications of the machine, which was designated as the No. 1, were given in that article.



SUPERIOR MACHINE AND ENGINEERING CO. DUPLEX HAND-MILLING MACHINE

The sliding surfaces are long in proportion to their width, so that the slides move freely. Each sliding member can be securely clamped in position. The machine is ordinarily driven directly from the main-line shaft. It can also be driven by a motor of 1½ hp. mounted on a bracket fastened to the base of the machine.

On the end of the main driving shaft is a change pulley, from which power is transmitted by belt to pulley on the lower spindle, and then through helical gears and a vertical shaft to the upper spindle. These gears are hardened and run in oil. The numbers of teeth on the gears are prime to each other, so as to insure a uniform distribution of wear. The spindles are made of high-carbon steel and run in bronze bearings. Graduated dials are provided on all adjusting screws for indicating accurate adjustments. The table is operated by means of the hand lever, through a rack and pinion. The machine weighs approximately 900 pounds.

Stevenson Model 6-A Multiple Gear Shaper

A machine for shaping all the teeth of a gear at one time was described on page 154, Vol. 55, of AMERICAN MACHINIST. The direction of reciprocation of the ram was vertical, and the cut was taken on the up-stroke. The machine was known as the Model 5-A multiple gear shaper, and was made by the Stevenson Gear Co., of Indianapolis, Ind. The same concern has now brought out a vertical-spindle, down-stroke multiple shaper operating on a principle similar to the up-stroke machine. It is known as the Model 6-A, and a view of it is shown in Fig. 1.

The machine operates in much the same manner as a vertical shaper or slotter, except that the tools are stationary and the gear blanks are reciprocated past them. The machine consists primarily of a multiple-tooled head for operating on the blank, which is carried on a ram. A feed mechanism is provided for bringing the tools gradually to depth on successive cuts, and a mechanism for indexing the gear blank a space equal to one tooth at every stroke of the ram.

The spindle and the arbor of the machine are both hardened and ground, so that the arbor with the gears can be very easily removed and replaced. In practice, two arbors are usually employed; and the operator fills one with gears while the other is in the machine. In Fig. 2, a view of the work mounted in place in the machine can be seen. The down-stroke type of shaper is particularly adapted to the cutting of spur-gear teeth on parts that have a somewhat larger diameter than the gear itself, so that the entire gear cannot be passed entirely through the head.

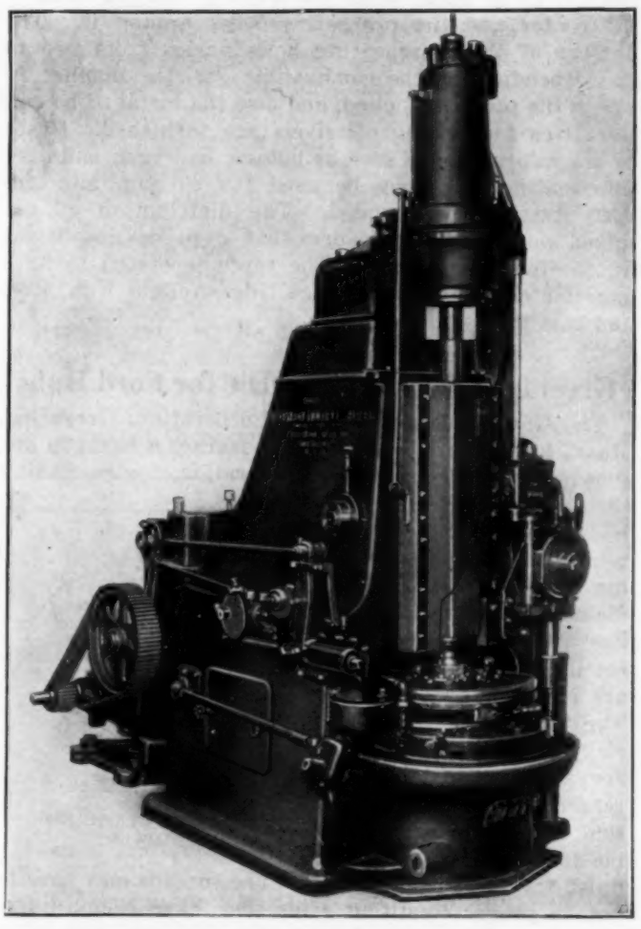


FIG. 1. STEVENSON MODEL 6-A DOWN-STROKE MULTIPLE GEAR SHAPER

When the arbor is placed in the machine, the draw-bolt is revolved by power to draw the arbor securely into the socket. An automatic overload throw-out disengages as soon as a predetermined pressure or tightness has been obtained. The ram is then lowered by power to the operating or cutting position, and automatically stops at the proper place. The operator starts the machine by means of an electric push-button switch.

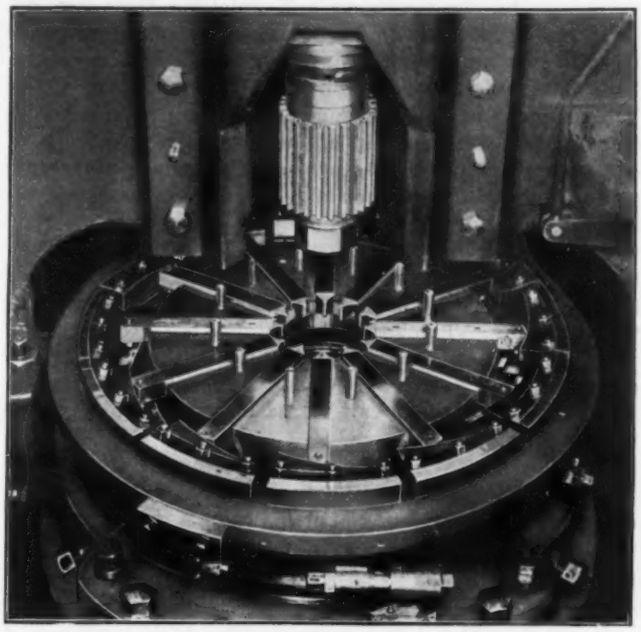


FIG. 2. ARRANGEMENT OF TOOLS AND WORK

To stop the machine, the push-button switch is again used, and an electric brake is applied automatically. The spindle is then raised, and the finished gears removed, so that an arbor carrying uncut blanks can be put in the machine. The entire time for cutting a gear occupies from one to four minutes, depending, of course, on the conditions. The time required for stopping the machine, changing arbors and starting again is slightly less than one minute.

The toolhead employed is interchangeable with that on the up-stroke machine. In Fig. 2 the chip guard and cover of the head have been removed, so as to show the arrangement of the tools. The toolhead consists essentially of a flat steel plate 30 in. in diameter, provided with a hole in the center and having a number of radial grooves in its face. Feeding movements are imparted by an annular sectional cam ring, to the tools which are placed in these grooves. As the gear blank is reciprocated, the tools are gradually fed in to the full depth of the tooth.

At the completion of each stroke of the ram, and before the next cut begins, the gear blank is indexed a space equal to one tooth. After the tools have been fed to the full depth, they are held stationary until the gear has indexed one complete revolution. This permits each tool to take one last cut on each tooth, so as to insure uniformity of spacing. Two toolheads are provided for each machine, so that while one is in use the tools on the other may be sharpened and reset. The machine itself may thus be used practically continuously.

The toolbits are rectangular in section, except for the V on the lower side. The gear-tooth profile is formed at

the inner end of the tool, and is backed off to permit sharpening without changing the form. The outer end of the tool rests against the surface of the cam, and means are provided for retaining it in close contact with the cam surface. Various types of cutting tools are provided, so as to care for different conditions and classes of work.

Ordinarily, the roughing and finishing tools are set alternately about the gear blank, the roughing tools slightly in advance of the finishing tools. The roughing tools thus cut grooves to the width of the bottom of the tooth space, and the finishing tools cut on the sides only. Usually the same number of tools as there are teeth in the gear are employed. However, this is not necessary, as multiples of the number of teeth, or numbers approximating the number of teeth, can be used.

The depth to which the tools are fed is determined by an adjustable micrometer stop located on the front side of the toolhead, so as to limit the rotary movement of the cam ring. The tools are automatically clamped in place during the cutting stroke, and unclamped at the end of the cut so that they may be fed forward again. The feed mechanism can be seen on the side of the machine in Fig. 1.

The mechanism for indexing the work is inclosed in the housing on top of the head. The mechanism for driving the ram consists principally of a crank mounted on the side of the machine and driving a reciprocating slide. Power is furnished by the motor shown mounted in the rear of the shaper and driving it by means of a silent chain belt. The motion of the slide is transmitted to the ram through two gears mounted on a rocking shaft. This mechanism serves also for temporarily elevating the ram during the time required for changing arbors.

The power for elevating the ram is obtained from a small motor mounted at the back and at the right side of the machine. The limits of travel of this motion can be adjusted by means of collars. Means are provided for easily setting the ram and the work in the proper vertical relation to the tools. When handling very heavy work, a small power-operated crane at the right of the toolhead is used to facilitate the insertion and removal of the loaded work arbors.

The machine is adapted to the production of parts other than gears in which there are teeth or grooves to be cut, such as in sprockets, splined shafts, reamers and milling cutters. The advantages claimed are the speed of operation and the accuracy of the work. The accuracy is due largely to the fact that cuts are taken simultaneously on all sides of the blank, so that the pressure is uniform on all sides and the work cannot spring away from the tools. Speed is obtained, not only because of the fact that so many tools are cutting at once, but also because a number of blanks can usually be cut at one time. The machine will be built in sizes to handle work of all classes.

Davis-Bournonville Cutting Torch

The oxy-acetylene cutting torch shown in the accompanying illustration has recently been placed on the market by the Davis-Bournonville Co., Jersey City, N. J. The torch differs in design from the model formerly made by the concern, in having two tubes instead of three connecting the head with the handle. The oxygen and acetylene are mixed in a chamber between the handle and the head. A special tip is required, so as to properly take care of the preheating gases, which have been mixed before reaching the tip.

The tubes are silver soldered in the head, which is

DAVIS-BOURNONVILLE CUTTING TORCH

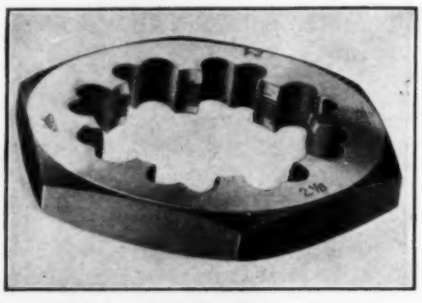
a copper forging and capable of withstanding high temperature without damage. The entire torch is strong and rugged in construction, although the weight is less than that of the previous model. Provision is made for easily removing the back end, in case it becomes necessary to clean the screen or renew the oxygen valve seat.

The ratio of the gases is controlled by two needle valves, one having a crossbar handle and the other a knurled disk handle. The oxygen valve is operated by a trigger so connected to a linkage that it remains in either the closed or open position. The operator may continue cutting without holding his finger on the trigger after the cut is started. Reverse pressure on the trigger closes the valve when it is desired to stop the cut. Spring pressure is utilized to hold the trigger in place until it is again desired to open the valve.

The tip is made of copper and held in a taper seat by a nut in a manner very similar to that on the standard torch. It is made with the cutting oxygen hole in the center and the preheating holes around it. The number of these preheating holes varies from two to six, depending on the combustible gas, the manner in which the torch is applied, and also the metal to be cut. Rent tips for cutting off rivets are furnished. Gases of low calorific value such as butane, hydrogen and even illuminating gas, may be used for cutting, although acetylene is recommended. The distribution of the mixed gases to the tip insures that all preheating flames are uniform in balance. The torch is stated to have superior characteristics for cutting wrought iron, steel and cast iron.

Greenfield Re-threading Die for Ford Hubs

The Greenfield Tap and Die Corporation, Greenfield, Mass., has recently placed on the market a hexagon die, shown in the accompanying illustration, for re-chasing threads on the hubs of Ford automobiles. The die is 2⅛ in. in diameter, and has 24 threads per inch. There are eight flutes. The tool is specially intended for the use of repair men, so that it is possible to easily refinish the threads on the hub. The threads may thus be put in proper condition after they have been injured either by blows or by crossing the threads in careless assembling.



G.T.D. RE-THREADING DIE FOR FORD HUBS

Parker Grinding Machine Spindles

The Ex-Cell-O Tool and Manufacturing Co., 1214 Beaubien St., Detroit, Mich., has recently placed on the market grinding spindles for use where very high

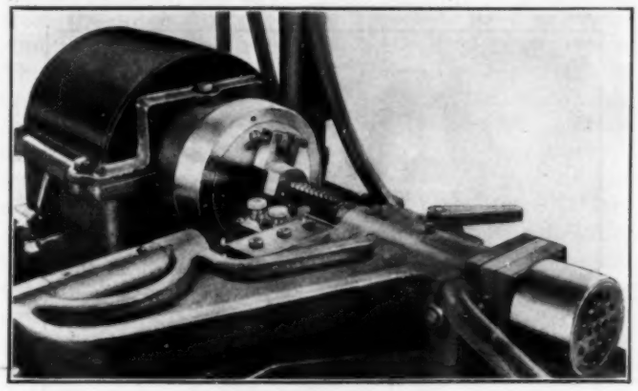


FIG. 1. PARKER AIR-DRIVEN GRINDING SPINDLE

speeds are required. The spindles are made in both belt-driven and air-driven styles. The type of bearings employed is the same in both cases. The spindles can be furnished to fit any make of grinding machine. A special mounting, such as shown in the foreground of Fig. 1, is used for properly holding the spindle. The abrasive wheel and spindle may be seen at about the middle of the illustration, while the air hose and the case of the air turbine are at the extreme right.

The belt-driven spindle, shown at the top of Fig. 2, is provided with two sets of ball bearings for both the spindle and the pulley shaft. A coupling is provided between the two latter members, so that the pull of the belt is not transmitted to the spindle itself. The sectional view of the air-driven spindle is shown at the bottom of Fig. 2. The turbine is at the right, inside the cylindrical case that was already noted in Fig. 1. The rotor is made of steel, and equipped with thirty buckets on its periphery. The air pressure used varies from 40 to 60 lb. per square inch, depending on the speed desired. The air is carried to the buckets through two nozzles. Driving by air is stated to permit of rotating speeds as high as

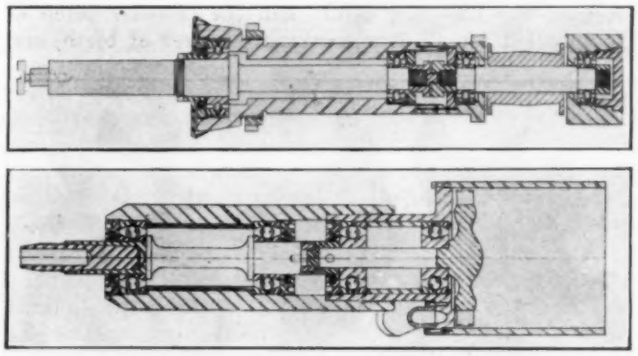


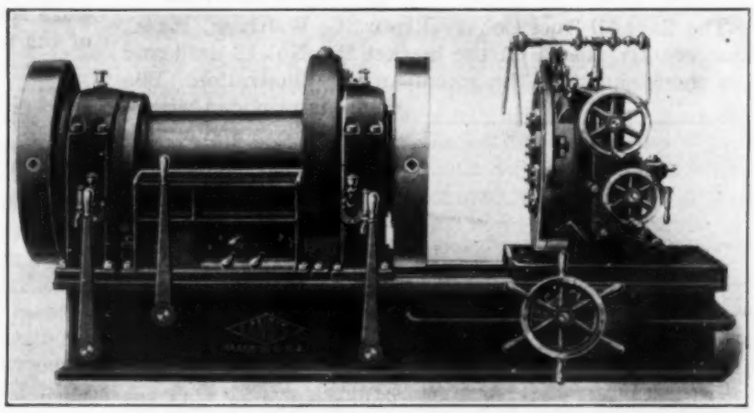
FIG. 2. SECTIONS OF PARKER GRINDING SPINDLES

100,000 r.p.m., and to cause much less vibration than that occurring when belts are employed.

The construction of the ball races is of importance, as the balls rest in rather deep grooves. The angles of the grooves are so proportioned as to cause the balls to rotate about axes perpendicular to the axis of the spindle, as well as about one parallel to it. In this way, uniform wear is obtained on the balls. The deep grooves allow for the taking of considerable thrust pressure, and prevent the spindle from moving longitudinally. Provisions are made for keeping the ball bearings sufficiently oiled. The spindles are stated to be free from vibration and suitable to a variety of small internal or form grinding operations.

Landis 12-in. Pipe-Threading and Cutting Machine

A 12-in. pipe-threading and cutting machine has recently been added to the line of pipe machines manufactured by the Landis Machine Co., Waynesboro, Pa. The machine, shown in the accompanying illustration, may be equipped for threading oil-well casing and hydraulic pipe, in addition to ordinary line pipe. It has a range from 4 to 12 in. and may be equipped to thread and cut pipe as small as 2½ in. Two dieheads are employed, a 6-in. head for a range from 2½ to 6 in., and a 12-in. head from 6 to 12 in. The entire range of each of these heads is covered by but one set of chasers, which are applicable to all sizes of threads.



LANDIS 12-IN. PIPE THREADING MACHINE

The carriage which supports the diehead, the cutting-off tool and the reaming tool can be moved by either power or hand. The power traverse movement operates either forward or backward, and is controlled by a lever located on the operating side of the carriage. To advance the carriage toward the chuck, the lever is pulled and held until the threading position for the diehead is reached. To reverse the movement of the carriage, the lever is pushed forward and held. Releasing the lever instantly stops the carriage, no matter at what point of its travel it is. Automatic stops prevent the diehead from coming in contact with the chuck in the forward movement, and the carriage from running off the guides in the backward movement.

The reaming tool can be quickly set to position and locked. The reamer is fed to the pipe by rotating the cutting-off feed handwheel in a counter-clockwise direction. Landis stationary pipe dieheads fitted with flat chasers are employed.

The chucks for gripping the pipe have three jaws. The jaws are geared, have universal adjustment and are self-centering to the pipe. The rear chuck is equipped with flange grips for fitting up flanges.

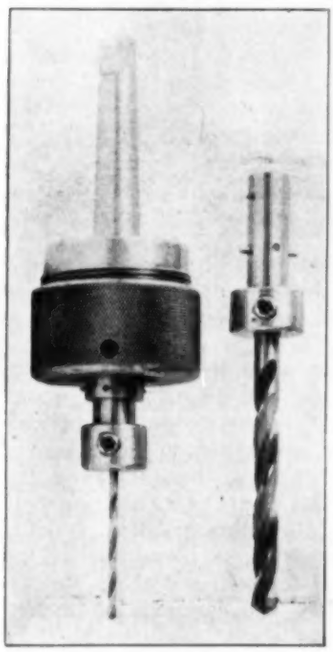
The machine has a single-pulley drive. The eight variations of speed are obtained in the speed box located under the main spindle, by shifting levers on the side of the box. The machine can be started and stopped by means of a friction clutch by operating either one of the two levers located at the extreme ends of the headstock. This construction enables the operator to start and stop the machine either when threading or when fitting-up flanges. A lever is located midway between the starting and stopping levers for reversing.

All gears are fully enclosed. With the exception of the main drive gear and its pinion, all gears run in an oil bath. The main bearings are lubricated by means of flat link chains which run in oil contained in large reservoirs. The driving pinion shaft and the reverse shaft are lubricated by sight-feed oilers. All levers are located on the operating side of the machine in convenient reach for the operator.

The machine can be converted to motor drive by substituting a sprocket for the pulley and fitting a plate to the side of the machine for mounting the motor. A silent chain connects the motor to the sprocket. All belt-driven machines have provisions for attaching the motor plate. The length of the machine is 11 ft. and the extreme width is 5 ft. It weighs 13,000 pounds.

"SaveAll" Drill and Tap Chuck No. 12

The SaveAll Tool Co., 49 River St., Waltham, Mass., has recently placed on the market the No. 12 drill and tap chuck shown in the accompanying illustration. The chuck is provided with a friction drive and a positive safety device. It has a No. 2 Morse taper shank. The range of capacity of the chuck is from $\frac{1}{4}$ to $\frac{3}{4}$ in. with either straight-shank drills or taps.



"SAVEALL" DRILL AND TAP CHUCK NO. 12

The collets can oe furnished with the size of hole desired to hold the drill. The drill is fastened in the collet by means of a hollow-head setscrew. The device is equipped with a shearing pin, so that if the driving torque becomes too great, the pin is sheared and the drill relieved of the turning force. The advantage of the arrangement is that it enables drilling at high speed with comparative safety. Should the drill or tap encounter some obstruction, the shearing pin will be cut before the drill is broken.

When the device is used, it is not necessary for the operator to give as great attention to the action of the drill, as the safety device takes care of any overload that may occur. The maker states that holes $\frac{1}{4}$ to $\frac{3}{4}$ in. in diameter may be drilled $\frac{3}{4}$ in. deep in machine steel at from 240 to 300 per hour without breaking or burning the drill.

Diamond Universal Hob for Cutting Sprocket Teeth

The Diamond Chain and Manufacturing Co., Indianapolis, Ind., has recently placed on the market a hob for the cutting of sprocket teeth. The hob operates on the same principle as those employed for cutting gear teeth, and each one is capable of cutting sprockets having any number of teeth and a given pitch and roller diameter. It is not limited to a small range of teeth, as with form rotary cutters. One hob is thus capable of doing the work formerly performed by six to nine cutters. A view of the hob is shown in Fig. 1.

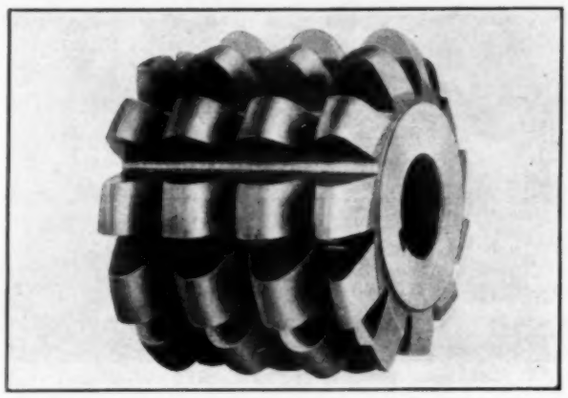


FIG. 1. DIAMOND UNIVERSAL SPROCKET HOB

The teeth cut by the hob conform to the specifications for the new "American standard" tooth form that has been approved by many manufacturers of roller transmission chains in this country, as well as by the Society of Automotive Engineers, the American Society of Mechanical Engineers and the American Gear Manufacturers' Association. With this tooth form, the space angle gradually decreases as the number of teeth in the sprocket increases, and the tooth angle gradually increases. The generating action of the hob tends to produce the same changes, although not at just the same rate.

In hobbing sprocket teeth, the following points that are at variance with the conditions encountered in hobbing spur-gear teeth should be noted: The circular pitch decreases as the number of teeth increases. It is desirable to increase the radius of curvature on the tooth as the lower or acting part is approached, and finally to change the curve from convex to concave. The pitch of the hob is greater than the circular pitch of the sprocket for all over a certain number of teeth, and

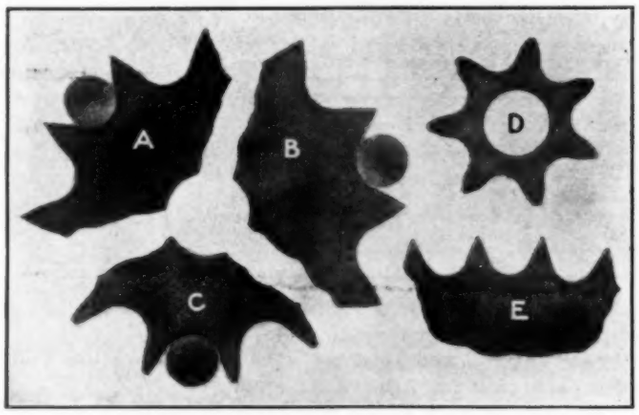


FIG. 2. EFFECTS OF VARYING PITCH AND NUMBER OF TEETH

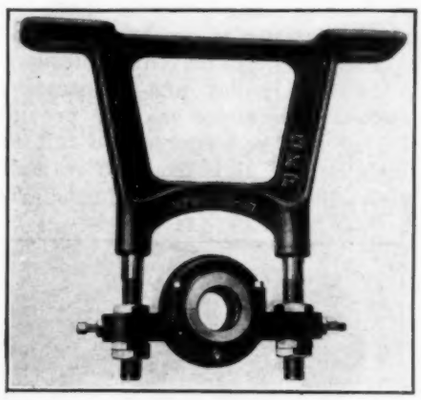
is less than the circular pitch of the sprocket for all sprockets having less than that number. Thus, the imaginary circle which rolls upon the theoretical pitch line of the rack is sometimes larger and sometimes smaller than the pitch circle of the sprocket.

The effect of making the pitch of the hob either less than the pitch circle of the sprocket, or greater, is shown in Fig. 2, the same hob being used in each case. The pitch of the sprocket was altered by changing the diameter of the pitch circle. At *A* the pitch of the hob is equal to the pitch of the sprocket; at *B* the pitch of the hob is 10 per cent less than the pitch of the sprocket; and at *C* it is 10 per cent greater than that of the sprocket. Thus *B* shows that if the hob pitch is less than the circular pitch of the sprocket, the tooth curve tends to become more convex, the angle of the tooth face tends to become greater, and the teeth are more pointed at the ends. The reverse conditions are true when the hob pitch is greater than the circular pitch of the sprocket.

After the hob pitch has been properly determined and the tooth contour properly designed, the entire range of tooth numbers can be cut without varying from the prescribed shape of the tooth as much as the various teeth do within the range of one rotary cutter of the ordinary type. Views *D* and *E* show the difference in form of teeth cut with the universal hob when the tooth numbers of the sprockets are respectively 7 and 56. Rapidity of cutting is claimed for the hobbing process, as well as accurate indexing.

Skayef Ball Bearing Line-Shaft Hanger

The accompanying illustration shows the improved ball bearing line-shaft hanger recently placed on the market by the Skayef Ball Bearing Co., 165 Broadway, New York, N. Y. The hanger is equipped with S. K. F. self-aligning ball bearings such as formerly employed. The device employs two-point suspension, thus carrying the bearing in a split housing rigidly held by two threaded suspension rods. The unit is strong, compact and easy to assemble, locate and inspect. The necessary vertical or horizontal adjustment can be made at the end of the housing by means of locknuts and set-screws. The pressure applied while making adjustments is not transmitted to the bearing.

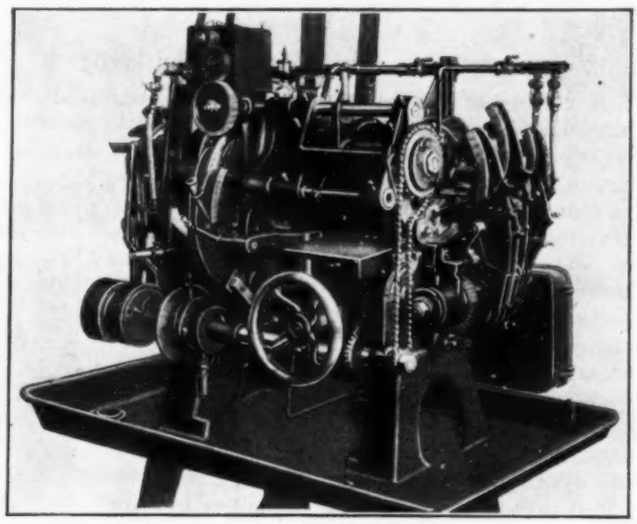


SKAYEF BALL-BEARING HANGER

The self-aligning feature of the bearing enables the shaft to turn with a minimum amount of friction, and prevents rubbing, heating and binding. The line shafting may be laid out on the floor with the bearings in plain view, and then raised in position for final adjustment with the upper halves of the housings off. This permits of securing correct alignment of all the bearings on the shaft. The low friction of the bearings permits of operation with only a small amount of power.

Slotting Attachment for Davenport Automatic Screw Machine

The Davenport Machine Tool Co., 167 Ames St., Rochester, N. Y., has recently developed a screw-slotting attachment for use in its five-spindle automatic screw machine. The machine, which was described in detail on page 669, Vol. 33, of AMERICAN MACHINIST, is shown in the accompanying illustration with the attachment in place. The attachment is intended for slotting all screws within the capacity of the machine, requiring no additional time for the operation. It consists primarily of a three-hole turret mounted on a suitable bracket, which is attached to the machine by means of the bolts holding the stationary head caps in place.



DAVENPORT SCREW-SLOTTING ATTACHMENT

The saw head is mounted over the revolving head and uses the same change gears as the machine itself. This arrangement permits of any change in speed desired. The whole attachment is protected by guards not shown in the illustration.

In the turret there are three sliding plungers carrying in their front ends bushings to fit the screws being slotted, and having T-heads at their rear ends. Three sliding spindles, one of which is the regular E-position tool spindle, are yoked together by a spider and given a sliding motion by means of the regular cam lever. Two of the spindles have heads with T-slots to engage the T-heads of the turret plungers; the third or front spindle carries the ejector which slides through the plunger.

The turret is revolved one-third of a turn at the same time that the crankshaft which indexes the machine revolves one full turn. The cycle of operations is as follows: Just as the screw is cut off, the plunger carrying the bushing pushes up over it, so that the screw remains in the bushing. The plungers are drawn back by the spindles to a stop and the head indexes. The turret at the same time revolves one-third of a turn, and the T-head of the plunger slides out of the T-slot of one spindle and into the next. At the next forward movement of the spindles, the screw is carried forward, slotted and returned. In the meantime, another screw is being picked up by the following spindle. At the third forward movement, the slotted screw is in the ejected position. Instead of the plunger sliding forward, the ejector pin passes through the plunger and bushing and ejects the screw. This completes the cycle.

Thus, at each forward movement one screw is picked up, another slotted and a third ejected. The attachment may be easily applied to the Davenport machine, and when not in use can be removed by taking out two bolts. With slight modification, the attachment can be used for other second-operation work, such as milling, cross-drilling and burring.

Simplex Machine-Time Calculator

A calculator for computing the time required for machine-tool operations, has been brought out recently by the Simplex Calculator Co., Box 184, York, Pa. The device has been designed for general use in the machine-tool field, and is applicable to either rotating or reciprocating work or tools, so as to cover all cases that may arise in the computing of machine time.

As shown by the accompanying illustration, the calculator consists of a cylinder within an aluminum case, and a slide rule of special design attached to an extension of the base. For use with rotating work or tools, as in lathe, boring mill, drill press, or milling operations, the cylinder carries tables indicating the revolutions made per minute for diameters of from ¼ in. to 10 ft. at all ordinary cutting speeds. The range of speeds is shown above the slot on the left-hand end of the case. The slide rule bears four scales, indexed successively: Feed, r.p.m., length and time.

The number of revolutions made per minute by a given piece of work is read in the slot opposite the diameter and directly under the cutting speed selected. This number is transferred to the rule, is located on the r.p.m. scale of the slide, and is moved directly under the number representing the chosen feed on the feed scale. The indicator is then moved along the third or length scale to the number representing the length of cut or inches to be traversed. Directly under this number, on the fourth scale, the result or time in minutes is read. Thus, to complete a problem for rotating work or tools requires but one setting of the cylinder, one movement of the slide and one movement of the indicator on the rule. The sequence of operations can be easily followed on the scales.

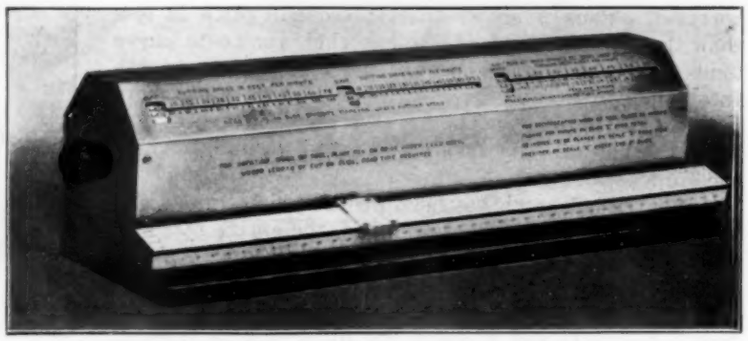
In connection with planer, shaper, slotter, or any other reciprocating tool, the procedure is similar. The number of square inches planed per minute at various forward and return speeds and feeds is read on the cylinder through the slot on the right-hand end of the case. To determine the total number of square inches of surface to be planed, the length is multiplied by the width, either mentally or with the rule. This result is divided by the number of square inches planed per minute, and with one setting of the slide on the rule, the quotient or time required is read on the fourth scale at the end of the slide.

This instrument is intended primarily for rate setters, estimators, and those whose duties require the daily or frequent predetermination of time for machine operations. It is a convenient desk size, being about 16 in. in length and not over 3 lb. in weight. With its use pencil calculations are eliminated, computing time reduced, and chance for errors minimized. Because of its simplicity, it can be used by anyone familiar with the practical side of machine-tool operation. Directions for operation are carried on the device itself.

Liberty "Elteco" Universal Toolpost Grinder

The Liberty Tool Co., Inc., Irvington, N. J., has recently placed on the market the "Elteco" universal toolpost grinder. The base of the device is ordinarily mounted on the swiveling toolslide of the lathe, as shown in the accompanying illustration. The spindle is mounted so that its height can be adjusted to bring it on the same level as the center line of the lathe spindle. It is hardened and ground, and provided with one taper bearing so constructed that adjustment for wear may be made.

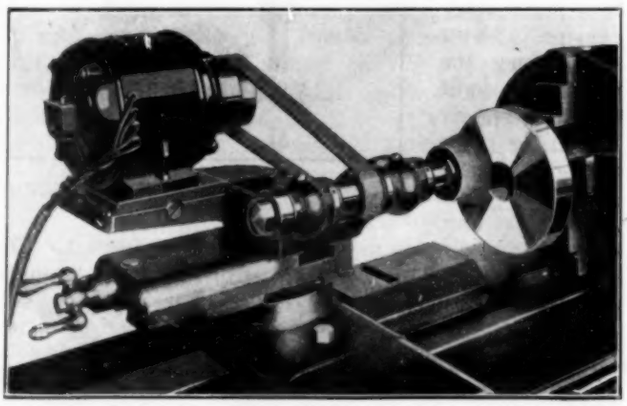
Different types of wheels and spindle extensions can



SIMPLEX MACHINE-TIME CALCULATOR

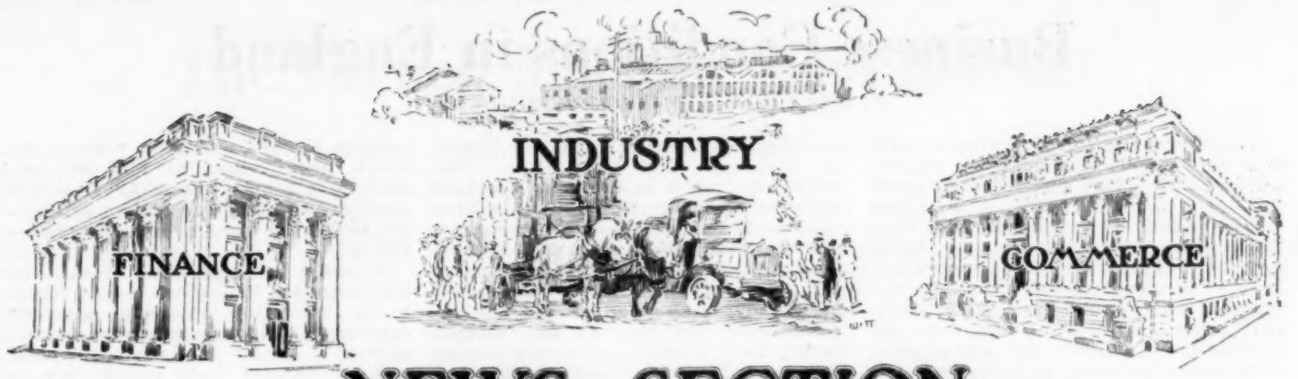
be used. These extensions screw on the threaded end of the spindle, and also fit the taper portion, to provide a true-running fit. When doing ordinary cylindrical grinding, the machine carries a 5½ x 1-in. wheel protected by means of a guard. When equipped for face-grinding, as shown in the accompanying illustration, a cup wheel may be employed. For internal grinding, two extension arbors are provided. Holes as small as ½ in. in diameter can be ground, the maximum length of the hole being 6 inches. Longer holes can be ground if the diameter is greater than the minimum.

The spindle is driven by means of a belt running on a two-step pulley and connected to a ⅓-hp. electric motor. The motor may be provided for either alternating or direct current, to suit the conditions of the installation. It is mounted on a slide, so that the tension of the belt can be adjusted. Both the longitudinal



LIBERTY TOOL CO. "ELTECO" UNIVERSAL TOOLPOST GRINDER

and transverse feeds are obtained, of course, from the slides of the lathe. The device is intended for doing accurate grinding work where large quantities are not required.



NEWS SECTION

Steel Foundrymen Study Manufacturing Problems

Officers and operating representatives of the Electric Steel Founders' Research Group held their regular meeting in Milwaukee on Feb. 6, 7 and 8. This group was formed about two years ago for the systematic prosecution of co-operative technical work which could be directly applied in improving the manufacture of steel castings.

Reports were made by the operating heads of plants on comprehensive investigations into important foundry problems. The group researches which were reported in detail at the meeting included those on the subjects of annealing, core practice, facing sands, furnace practice and pouring practice.

The members of the group are the Electric Steel Co., Chicago; the Ft. Pitt Steel Casting Co., McKeesport, Pa.; the Lebanon Steel Foundry, Lebanon, Pa.; the Michigan Steel Casting Co., Detroit, and the Sivyer Steel Casting Co., Milwaukee. The headquarters are at 639 Diversey Parkway, Chicago.

Committee To Study Unemployment

The fundamentals of unemployment and control of the business cycle are to be the subjects of a thorough investigation by a special committee of the President's Conference on Unemployment, selected last week at a meeting in the Department of Commerce. Owen D. Young, vice-president of the General Electric Company, was named chairman; Joseph H. Defrees, president, Chamber of Commerce of the United States; Clarence Mott Woolley, president, American Radiator Co.; Matthew Woll, vice-president, American Federation of Labor and Miss Mary Van Kleeck, Russell Sage Foundation, are the other members of the committee. Edward Eyre Hunt, secretary of the President's Conference on Unemployment was appointed secretary of the new committee, and Wesley C. Mitchell, of New York, was named field director of study.

Auto Exports in 1921

During the year 1921 41,392 motor cars were exported from the United States. Of this number, Latin-American countries took 33.1 per cent; British North America, 15.4 per cent; Asiatic countries, 14.5 per cent, and Europe, 13.1 per cent.

Pittsburgh Conference on Engineer Training

The United States commissioner of education has called a conference on commercial engineering on behalf of a committee appointed by him to investigate business training of engineers and engineering training for students of business. The conference will be held May 1 and 2 at the Carnegie Institute of Technology in Pittsburgh. President Arthur Hamerschlag of this Institution is a member of the committee.

The conference will be open to the public. Invitations to appoint delegates, will be sent to commercial and trade organizations.

Aeronautical Chamber of Commerce Meeting

A special meeting of the Aeronautical Chamber of Commerce was held at its rooms, 501 Fifth Ave., New York, on Feb. 24 for the purpose of nominating governors for the different classes of membership and getting their activities under way. The meeting was well attended by representative men of the various aircraft industries.

The nominations for governors for Class A, or manufacturers of aircraft, were: C. C. Witmer, F. H. Russell, J. L. Larsen, Grover C. Loening, S. S. Bradley and F. B. Rentschler. For Class B, makers of instruments and accessories, they were: B. E. Bushnell, Charles H. Colvin, Sherman M. Fairchild and Lawrence B. Sperry. For Class C, C. F. Redden was the nominee.

Meetings at frequent intervals were suggested to discuss the technical side of aviation. Attention was also called to the desirability of keeping in touch with aviation meets, and of working with the Congressional committees which are interested in the development of aviation.

Polish Bonds to Buy Motor Trucks

The rumor that the Polish government is to spend $10,000,000 on various kinds of machinery seems to be based on the following facts: Polish bonds to the amount of about $3,000,000 are to be offered in the United States. If they are sold, the money realized is to be spent here for motor trucks and other mechanical equipment. The greater part is to be spent for trucks.

President Signs Patent Office Bill

The President signed the Patent Office relief bill on Feb. 18. Since the bill carries only the authorization for the appropriation, the reorganization and installation of additional personnel must await the actual granting of the money. It is probable, however, that the appropriation can be carried in a forthcoming deficiency bill. The change in patent fees does not become effective until April 19.

The bill just passed raises the salaries of the principal examiners from $2,700 to $3,900 a year, and the pay of the assistant examiners is increased by from $150 to $900 a year. The commissioner's salary is to be $6,000 instead of $5,000. The additional salaries provided for are paid by additional fees. The meagre increases cost the taxpayer nothing. The five members of the board of examiners in chief, appointed by the President, men whom the statute requires to have both a legal and a scientific education, are to get $5,000 instead of the present $3,500. The pay of the clerks, at present the lowest in the Federal service, is raised from $720 to $1,100. The eight chiefs of clerical divisions are to get $2,500 instead of $2,000. The pay of the two examiners of interferences is put up more handsomely from $2,700 to $5,000 and that of the five law examiners from $2,750 to $4,000.

The increase of the force provided by the bill consists of one law examiner, twenty-six assistant examiners and twenty-two clerks. Insufficient as it is, the bill will check the exodus in the Patent Office and infuse new energy and activity. The loss, however, of so many men of long experience and special training cannot be made good immediately.

J. Wallace Carrel President Cincinnati Metal Trades

At the annual meeting on March second of the Cincinnati branch of the National Metal Trades Association the following officers were elected: President, J. Wallace Carrel, vice-president and general manager of the Lodge & Shipley Machine Tool Co.; vice president, E. A. Muller, vice-president and general manager of the King Machine Tool Works; secretary, David C. Jones, vice-president of the Lunkenheimer Co.; treasurer Neil Lamont, works manager of the Laidlaw Works of the Worthington Pump and Machinery Corporation.

Business Conditions in England

BY OUR LONDON CORRESPONDENT

The official figures of overseas trade bear out the general impression regarding last year. It is shown that imports totalled about 1,087 million pounds, the corresponding declared value for 1920 being about 1,923 million pounds, while exports of United Kingdom produce last year were valued at less than 703 million pounds, as against nearly 1,334 million pounds in 1920. Similarly re-exports (exports of foreign and colonial produce) were valued at more than 107 million pounds against about 223 million pounds. Of imports, the chief groups are food, drink and tobacco at about 567 million pounds; raw materials and articles mainly un-manufactured, more than 271 million pounds; and articles wholly or mainly manufactured more than 245 million pounds. Similarly in exports, food, drink and tobacco accounted for nearly 38 million pounds, raw materials, etc., 64 million pounds and articles wholly or mainly manufactured 589 million pounds. One export item last year which showed an increase was that of machinery which exceeded 75 million pounds in value. Putting it roughly, both exports and imports were only a little more than half the value of 1920, part of the difference being due to differences in prices. Calculating on average values in 1913, it has been shown that total imports were down last year by 25 per cent, total exports by 50 per cent, and re-exports by 21 per cent.

Fewer Company Registrations

Some figures have recently been made available relating to company registrations during last year. These totalled 6,395, with a capital of £99,034,-325, compared with 10,065 companies in 1920 capitalized at £568,894,382. Last year engineering businesses provided 351 companies with a capital of £2,948,-375; and motors 288 companies with a capital of £2,390,084.

The decline in merchant shipbuilding last year is shown in the annual summary just issued by "Lloyd's Register," which gives the world's output as 4,341,-679 tons. Of this the United Kingdom was responsible for 1,538,052 tons, or about 35 per cent, and the United States for 1,006,413 tons. Great Britain produced about three-quarters of her previous year's output, and, according to the figures given, the United States produced a little less than half the previous year's output. Germany is credited with 509,064 tons, and Holland, Japan and France each approached the quarter-million figure.

But all is not dismal. The government finds it easy to raise money at lower rates, and National Saving Certificates (a highly popular and profitable means of thrift) are to be raised in price. Appeals for capital have been quickly over-subscribed, the general pleasure in Washington conference decisions is almost unabated (though the linked sweetness seems a little too long-drawn-out for popular staying power) and the Cannes fiasco has only helped to strengthen the growing determination that the future of Europe (or is it of the whole civilized world?) shall be settled not by gusts of revenge, greed or fear, but by consideration of economic facts. The official figures of cost of living show another decline, now being 92 points above the pre-war figure, the lowest in fact since 1918. The largest decline is in the actual cost of food; rents, among the main items, have risen somewhat. Unemployment figures have shown a decline recently. According to the Ministry of Labor the mean percentage of unemployed during last year among the trade unions making the returns was 15.3, no such height having been reached previously during the seventy years during which these figures have been collected. In the engineering industry probably more than 25 per cent are unemployed, this apart from men on short time. Last year a reduction of about six million pounds was effected in the wage rates of more than seven million workpeople officially in review, but not including such classes as certain municipal and government employees, domestic servants, shop assistants and agricultural laborers. These reductions more than wiped out the increases reported during the previous year.

The Machine Tool Trade

A return has been supplied by the Board of Trade to the European edition of AMERICAN MACHINIST showing exports and imports of machine tools from and into the United Kingdom during last year. Dealing only with complete tools, the weight of British-made tools exported was 19,972 tons, valued at £2,888,448, or about £145 to the ton. This is a 50 per cent increase on pre-war ton values, and of course the total value, though less than 1920, is otherwise the highest entered for any given year and is about three times pre-war value. The weight also exceeds last year's figures and is about 33 per cent above pre-war rates.

Of machine tool imports the total on the same basis amounted to 2,940 tons or less than the pre-war average; and the value amounted to £609,339, or about twice pre-war values, the value per ton being about £207, which is also about twice pre-war figures.

An analysis of the figures published by the European edition shows that taking values per ton, only in the case of drilling machines is the British article higher than the imported tool. It also makes quite plain the fact that the average tool imported is much lighter than the average British machine tool exported; the average lathe imported, for example, weighing 0.43 tons, as against an export figure of 2.46 tons. Similarly, in drilling machines the figures are 0.23 against 1.19, grinding machines 0.47 against 1.03, planing and shaping machines 0.74 against 3.83, and in presses, etc., 1.95 against 3.78. But in milling machines the average tool imported was slightly the heavier, namely, 1.66 tons as compared with British export at 1.57 tons. The official tables need to be further sub-divided as, taking values, nearly a quarter of the exports and more than a third of the imports are entered under the heading "other." In exports, the largest single item, approaching £1,000,000 (£974,392 in fact) was for lathes, the next being drilling machines at £380,-836, followed by planing and shaping machines at £298,675. Lathes also form the largest item in the import values, namely, £79,502, excepting presses, etc., which were valued at £145,663, with drilling machines at £52,347, milling machines at £46,719, grinding machines £43,459, and planers and shapers at £23,797.

A scurry through some of the leading machine tool firms would necessarily leave the on-looker somewhat depressed, and specialists have found it advisable almost to drop the production of machine tools and to take up ordinary engineering manufactures and repairs. The lack of orders extends over almost the whole field of machine tools but several press firms have been very hard hit and one in particular has, according to report, made some very doubtful debts. Very few of the motor car firms can be regarded as busy, though this is certainly true of three or four in the Coventry district, mainly engaged in the production of the lighter car. The export trade is wanting. Returning to machine tools, some firms, besides necessarily diminishing the works staff, have also discharged a very large proportion of the office personnel. But this is not true in every instance. The drawing office of Alfred Herbert, Ltd., Coventry, for example, appears to be just as busy as when trade is booming. The firm is introducing a new, or rather revised, lathe with V-bed and all slides completely covered, besides a number of smaller machine shop items.

Prices Down To Get Orders

Machine tool prices have, of course, been lowered, in some cases by 20 or even 25 per cent; in fact the representative of one firm was told that a competitor had reduced his price since last June by 30 per cent. Of course, similar statements are often made for the purpose of obtaining further concessions, and a case within the knowledge of the writer recently forms an instance. Some special engineering material, made by three or four firms only, was quoted by one firm at £40 a ton, this not including any machining, which, it was subsequently discovered, would be needed. Being given fullest particulars, another firm quoted £30 and was told over the telephone by the purchasers that they had expected to pay £27 but would be willing to go to £28 if that price would be accepted at once —and it was. Another firm, in this case a well-known machine tool concern, to secure an order reduced by £800 the price of a machine described as by no means expensive.

A statement made by the liquidator of the Aircraft Manufacturing Co., Hendon, will be read with some attention on your side. It claimed that the Gnome and Le Rhone engines, in which the company is interested, were used for the United States aircraft, in connection with which "the company had not been adequately remunerated," to use the words of the liquidator. Holt Thomas, a former chairman of the company, wrote that "the De Haviland machines are now the favorite of the world." He believed their use for peace purposes in the United States was a breach of agreement. "If it were not for this the good will and designs would be worth a large sum to the company in the United States."

The French Machine Tool Market

By C. E. CARPENTER
President, C. E. Carpenter Co., Société Anonyme, Paris, France

The opening weeks of the new year have witnessed an improvement in the demand for machine tools in France which, if maintained, will help a great deal toward dispelling the gloom resulting from last year's almost total suspension of business. By this, it is not meant that anything approaching a brisk demand has sprung up. On the contrary, buyers are "few and far between" and those that have purchases to make are exceedingly careful in selecting the best values for their investment. However, the fact remains that inquiries are being sent out in increasing numbers and that a fair amount of machinery is being purchased.

In some cases the purchases are the result of the carrying out of long-deferred programs, indicating that a better feeling concerning the future exists among metal-working plants. In other cases machines are being bought by foreign manufacturers who seem to have come to the conclusion that the future possibilities of the French market warrant the development of branch factories in France, while the third category of buyers comprises those shops that need one or more machines for replacement purposes or for rounding out their normal equipment. In the aggregate it can be conservatively stated that a substantial amount of machinery has been bought during the past five weeks, and, furthermore, that the next few months should bring a further improvement in the demand.

The price question is not so encouraging, for while sales have been made, the buyers, rather than the sellers, have profited in the majority of transactions, the reason being that business in France is decidedly in the throes of the liquidation process to the consequent advantage of the buyer. The seller, with true French tenacity, resisted the encroachment of the inevitable readjustment until the marked improvement in the exchange rate gave warning of the impending drop in values.

Liquidation in Process

The liquidation process, as far as machine tools are concerned, promises to be a very complicated and prolonged one, for not alone have the importers been loaded down with heavy stocks left over from the post-war inflation, but the shop owners themselves have had, and still have, sufficient surplus stocks to make them formidable competitors of the legitimate dealers and importers. The tremendous activity of the metal-working plants during the war and following the armistice brought about the importation of a great many more machine tools than such plants need for their normal work. Great numbers of machines are therefore idle throughout the country and their owners have begun to take stock of them and to seek to find a means of either disposing of them for much-needed cash, or of exchanging them for other needed equipment.

The direct result of this situation has been the creation in France of a second-hand machine tool market, which did not exist before the war, but which is now so firmly established that it is certain to be an important factor in the trade until the large surplus stocks are thoroughly digested. In the beginning of the development of the second-hand market there was considerable mistrust of used machines on the part of the large users, but the rapidly mounting prices of new machines caused many buyers to overcome their prejudice and to experiment with second-hand material. The experiments were apparently satisfactory, for a heavy trade has since sprung up and it can safely be said that few buyers nowadays purchase machinery without having first thoroughly canvassed the second-hand market.

Left-over Army Stocks

Probably one of the greatest factors in the creation of the second-hand machinery market in France were the stocks of machines in the American and British army repair shops throughout France. In the case of the American army, all the stocks were taken over by the French government and reserved for the needs of the devastated provinces; while in the case of the British stocks the British Ministry of Munitions, through its branch in Paris, advertised them extensively in the French press. When prospective buyers found that the machines were in excellent condition and fully tooled and that the prices were considerably below normal market values, they were encouraged to seek further for similar bargains. Many buyers also visited the American camps and endeavored to make purchases but were prevented by the ruling favoring the devastated provinces of the North.

In the partially dismantled American camps no machine tools now remain, except at Verneuil, the main repair shop of the Motor Transport Corps. At Verneuil, the machine tool equipment is still intact, but will shortly be offered for sale by the private liquidators who have taken it over from the French government. Efforts are being made to dispose of the Verneuil repair shop as a single unit. If this method proves unsuccessful which it no doubt will, on account of the unfavorable situation of the place for a manufacturing enterprise, the machines will be sold in single lots, thereby further adding to the difficulties of machine tool importers, for the Verneuil equipment comprises a large number of the best makes of American machine tools, and they were so slightly used by the motor transport mechanics, that they are to all intents and purposes equivalent to new machines. A complete inventory of the machine tools in the Verneuil shops, if printed, would resemble very closely the index to the advertising pages of the American Machinist.

Surplus army stocks, however, important as they have been on the machine tool market during the past three years, are comparatively small in comparison with the vast numbers of machines still in the hands of machine shop owners, which will eventually find their way into trade channels. A notable case that will serve as an illustration is that of Automobiles Berliet, of Venessieux, near Lyon. The Berliet plant, begun during the war and completed after the armistice, was built for the purpose of manufacturing a low-priced car on American lines. It aimed at what was, for France, a very large production and no expense was spared in equipping it with the best American machine tools. Before the production could be got fairly under way the bottom dropped out of the automobile market and it was found that a large part of the machine tool equipment could not be used for a long time to come. Printed specifications of the surplus machinery were distributed broadcast among French machine shops and dealers and many sales were made at substantial prices. Another notable instance is that of a large shop in the southern part of France which purchased, during the latter part of the war, a complete machine tool equipment for the production of aviation motors with the ultimate object of the construction of automobiles or tractors. Labor troubles after the armistice interfered with the after-war program so seriously that some months ago the entire machine tool equipment was placed on the market.

American Machines in Favor

The direct result of these, and many similar instances, coupled with the unfavorable rate of exchange prevailing between France and the United States, has been to discourage importations of American machines. On the other hand, some consolation is to be found in the fact that importations of German machines have likewise been affected, since German prices even though low have been higher than those asked for surplus stocks of American machines. Another point of great importance to future American trade with France is the fact that, due to the comparatively low prices of surplus and used American machines, many of the small shops have been able to buy them and to become familiar with American accuracy and design. Before the war, these small shops were content to buy exclusively German machines. As conditions now are, not until the stocks of new and used American machines are thoroughly digested will it be possible for German machine tool builders to gain much headway in France; and by that time it is to be hoped that not only will German production costs have greatly increased but that the exchange rate between France and the United States will have improved to a point that will render further substantial importations possible.

Market for Oil-Well Equipment in Argentina

Argentine purchases of oil-well equipment and supplies promise to be important during the present year, according to advices received from commercial attache Edward F. Feeley, of Buenos Aires. Large manufacturers are urged to keep on the ground qualified representatives who are thoroughly acquainted with the technical features of the business.

Business Conditions in Germany

By OUR BERLIN CORRESPONDENT

The skeptics in German industry who doubted the soundness and duration of the business boom, have been satisfied by subsequent developments. Starting with the iron and steel industry, where the record business of November suffered a sharp decline in December, slackening of business spread all over the metal industries. The weakening of the domestic market is not yet very extensive; the export market has been strongly affected by the reverse movement of the exchange. The large volume of business concluded at the culmination of the boom, which was coincidental with the lowest mark quotations, is tottering, and threatens to demoralize the export business. A great many of the export orders filled in November are in a state of cancelation. Either the buyers or the sellers were quick to attempt a withdrawal, when in December the mark doubled its November value. Where the contracts were payable in marks the foreign buyers fought shy, and if made out in foreign money the German sellers felt the pinch. The events of December are a drastic illustration of the one-sided merits of the new policy to sell in foreign currency on export orders. Although sellers have it in their hands to insure themselves by making use of an arrangement offered by the German States Bank to cover against the day of delivery within one year from the receipt of the order, it seems that very few manufacturers have made use of it. The most pressing necessity of the times, the stabilization of the exchange, could not be put forward in a stronger light than by recent experiences.

Disappointed at Cannes

The rapid change of complexion in the money market and the outlook upon the Cannes conference, where decisions most vital to German industry were held in abeyance, are primarily responsible for the sudden drop of business. The population was led to expect a new settlement favorable to German finances, the influence of which on business no one seemed quite able to foreshadow. The greater part of the press of the country was tuned to hopeful strains, signaling a new and better era; but manufacturers were not able to see the advantages if the expectations promised by the Cannes conference were realized. Although Dr. Rathenau, who doubtless represents large industrial interests as well as public ones, plays a prominent part in this matter, the iron and steel industry, comprising the machine building and metal working industries, is generally opposed to the government's policy with regard to the reparations. The point of view prevailing in this industry may be gleaned from the opinions heard at an interview with an industrial leader of high standing, who also plays an important part in public matters. These opinions are of unparallel frankness, which explains the desire of the gentleman in question not to disclose his identity. They are quite typical of this class of business man. Asked for his opinion of the consequences of a moratorium on Germany's economic life, and specifically on the German industry, the following answer was made:

"A moratorium, as contemplated at Cannes, has the avowed object of giving Germany a short time to rally its strength—hardly more than a breathing spell, which is entirely insufficient. Germany needs four to five years of absolute rest, free from outside pressure. Germany is a body with thinned-out blood, shaken by the consequences of serious illness. In foreign countries the strength left in this body is largely overrated. This is particularly true of the industry. Small blame to them in this respect, as the German industry itself has been and is still overrating its strength considerably, and is only now commencing to realize its true relation of strength to foreign rivals. The truth in this respect has been deliberately suppressed inside and outside the country. Reports on the external conditions of the industry, often highly flavored according to the immediate objects in view, have been circulated widely, but serious critics of internal conditions have found very little or no opportunity to voice their opinion in public. Foreign countries have formed an entirely erroneous opinion of the state of German industry. This prosperity exists on the surface only, and disappears under the critical eye. It exists solely on the grace of the under-parity of our cost of material and labor. It is necessary to preserve a sufficient margin between this under-parity and the rate of exchange. The cost of material and labor has a constant upward tendency. There can only be a certain stability of business as long as the rate of exchange has a corresponding movement.

"It was the chief aim of the Cannes conference to stop further depreciation of the German currency and to help the mark to improve. At the same time, it was aimed to further raise the price of coal and transportation, which naturally would result in a general rise of prices and cause a considerable increase in manufacturing cost. The inevitable result would be the elimination of German industry from competition in the Western markets. This is no exaggeration, as can be seen from the fact that certain classes of industry find it hard, even under the present conditions, to compete against foreign rivals. The opening of the Eastern market would be an entirely inadequate compensation, even if it could be performed as quickly as optimists think. The decision contemplated at Cannes would put the German industry in a very precarious, not to say critical, situation. Payments in kind instead of gold, as arranged under the Wiesbaden agreement, would not bring relief, as they would not work in practice. They amount to a compulsory export, a matter which is in such sharp antithesis to the laws of supply and demand that it would be idle to count upon them."

Inefficiency of Industry

Turning to the specific condition in the German iron and steel industries especially with regard to the manufacturing cost in comparison with other countries, the following opinion was expressed:

"It is true that we pay much less for labor and material, especially in comparison with the United States, our chief rival, but no conclusions should be drawn from this fact alone, without taking all other conditions into consideration. Our factories have deteriorated. They are full of equipment fit only for scrapping. A large part of the old machinery left over from the war has, by misunderstood economy, been kept in service. Our labor conditions, although the efficiency of the workmen has greatly improved during the last year, are far below normal. Manufacturers are forced by law to keep a large amount of unproductive labor. This and other burdens for the benefit of the workmen are greatly adding to overhead expenses. The eight-hour day, which in reality is only a seven-hour day, is entirely inadequate for a country thrown upon work as its main asset. We have again a piece-work system but only by name. It is really only a premium system, and not a very efficient one at that. The control of the manufacturers has been greatly restricted under the Shop Council Law, which so far has only acted as a handicap to efficiency, and is benefiting solely one side, that is, the employee. Germany has always been far behind in the highly advanced economics of the shops in the United States, and is now further removed than ever. Modest attempts to copy American methods started in pre-war times but were interrupted by the war, and have never been resumed. During the intervening years nothing has been done to eliminate waste of material and labor and nothing can be done under present conditions. On the contrary, since the outbreak of the war the industry of the country has been drifting away from this aim, and is now wallowing in waste."

Machinery Trade Busy

In the machine building industry it can be noticed that competition, which in November was hardly noticeable, has again commenced, resulting in a certain amount of underselling. This applies particularly to the weaker members of the industrial family. As a consequence, the upward tendency of prices has reached its culmination, and prices are again more or less on the retrograde. The latter is somewhat accelerated by information coming from all parts of the machine building industry of tenders for foreign specifications having fallen through on account of high prices.

In the machine tool building industry the business in hand is still large, keeping manufacturers employed for several months ahead. Cancellations are, however, not infrequent, and many orders for long delivery have already been annulled. Manufacturers are as a rule not over-eager to bind buyers to their bargain if the orders were given at firm prices. During October and November many manufacturers had booked orders for export in the currency of the buyer, when the mark was 250 to 300 to the dollar. In view of the certain increase of cost and overhead, and in consideration of the uncertain hope that the rate of exchange would again sink to the level on which the quotations were based, they are only too willing to withdraw and are often doing their best to force cancellations.

The Business Barometer

This Week's Outlook in Commerce, Finance, Agriculture and Industry Based on Current Developments

BY THEODORE H. PRICE
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Actors and public speakers understand that there is generally an interval between the delivery of their most telling passages and the response of the audience in laughter, applause or disapproval.

In the financial and commercial markets there is a similar interval between the time at which a change in basic conditions becomes apparent and the reaction of the public mind as expressed in prices. The reason for this interval is the same in both cases. Individually or collectively the intelligence of the average man is slow to appreciate the significance of what he hears. He takes time to make up his mind and more time to act upon his conclusions. In the case of influences that are at all obscure, or for an understanding of which an academic knowledge of economics is necessary, the interval between cause and effect is likely to be lengthened. To most business men seeing is believing and they wait for leadership before taking the course logically indicated by what they hear. This explains why so few buy at the bottom and sell at the top, and why the merchant or speculator must understand psychology as well as arithmetic if he is to succeed. It also explains why we are only just now beginning to feel the effect of the change in conditions that was apparent and repeatedly pointed out in these letters weeks and months ago.

World Markets Firm

The markets on both sides of the Atlantic were nearly all affirmatively strong last week. In London the stock exchange was described as booming and both speculative and investment issues were eagerly bought on easy money and the advance in exchange which carried sterling up to 4.41¼ last Thursday and lifted francs, Canadian dollars and most other foreign currencies proportionately. German marks and Austrian kronen were the only laggards in the upward movement, but they are hopelessly and literally water-logged by the flood of paper money which flows from the printing presses at Berlin and Vienna.

The *Bankers Magazine* of London estimates that the advance during January added 113,751,000 pounds to the market value of 387 standard securities, and the additional rise during February has probably doubled this so that the English are "feeling richer" by more than a billion dollars.

In New York both bonds and stocks are higher, but the activity has shifted from the former to the latter and has been especially noticeable in the case of the low priced railway shares whose earning power and strategic value in the inevitable consolidations provided for in the Esch-Cummins bill speculators and investors are at last commencing to discover. That the far-sighted crooks who run the bucket shops are welching under cover of bankruptcy is another indication of good times.

On the Chicago Board of Trade wheat has sold at an advance of more than 40 cents over the season's low. Corn is up 14 cents from the bottom and hogs, hog products and cattle are well on the way to the level of normalcy.

Price Trend Upward

In the cotton market there has been a recrudescence of bullish sentiment and though the advance has halted around 18 cents, the present feeling is that a crop of 10,000,000 bales next year will be too small to supply the increased American consumption plus the larger demand from Europe that is expected as a result of the greater purchasing power indicated by the advance in foreign exchange. The prices for many of the less talked of commodities such as hides, leather, wool, lumber, coffee and cotton oil are likewise tending upward, and while sugar was slightly lower, the much talked of surplus is being distributed with amazing rapidity. The steel business is looking up because the railroads are buying more freely and a slight decline in copper, due probably to the expectation of an increased supply from the recently reopened mines, is almost the only exception to the upward movement.

Although February is normally the dullest month of the year in the retail trade the consumptive offtake is gaining and this is reflected in jobbers' sales, which are increasing, although the buying is still from hand to mouth. Cotton fabrics are in better demand. The American Woolen Co. is sold up on many of its lines and has withdrawn them while dealers in silks say they are doing a good business despite the discreditable gyrations of raw silk in the Yokohama market.

Confidence Restored

Railroad traffic is gaining, car loadings are increasing and earnings are much better than had been expected. There seems every reason to expect a cumulative gain in the volume of business at gradually advancing prices as spring opens and summer approaches. The persistent pessimism of the last twelve months has restricted buying. Shelves are bare. Stocks are low all along the line from producer to consumer and it will take some time to replenish them. But the recognition of these conditions recently manifest in the more speculative markets is not yet universal.

Some are still skeptical and we must continue to make allowance for the interval between good news and its complete acceptance. When that time arrives the upward movement will be finished, but as it has taken nearly a year of rising bank reserves to convince a relatively small proportion of the business community that the tide *could* turn another year may elapse before everyone realizes that it *has* turned. By that time it will probably have reached its flood and those who then suggest that it may fall again may be execrated for their farsighted pessimism as was the writer for his optimism twelve months ago.

But for the present and the near future there is nothing to indicate any contraction in the abundant supply of credit upon which the revival now in progress is pedestalled. The Federal Reserve statement, published last Friday, is in fact almost sensational in the plethora of money that it reflects. The reserve ratio has advanced from 76.4 per cent to 78.1, and the stock of gold has gained another $10,000,000. The Federal Reserve notes in circulation amount to $2,255,000,000, and the deposits to $1,772,000,000, against which there is held $2,947,000,000 in gold. These figures are, I think, almost without precedent in the history of banking. It is not surprising therefore that President Harding and the Federal Reserve Board are exultant in predicting better times, although it is hard to see how they can prevent the gold inflation so frequently prophesied in these letters, unless they persuade Mr. Fordney to include a prohibitive duty on further imports of gold in his tariff bill.

The Coal Strike Menace

There are, however, as usual a few clouds on the horizon and, although they are not very black, they are not to be ignored. The darkest is the threatened coal strike set for April 1. There is reason to hope that it will be averted, now that the miners and the operators are talking together. The public do not fully understand the merits of the controversy, but if it issues in a coal famine the consumers will make their anger felt through Congress and both parties to the quarrel are commencing to realize this.

The postponement of the Genoa Conference now practically agreed upon is another shadow across the path of reconstruction in Europe that may or may not be of auspicious augury, but in so far as the United States is concerned it is not immediately important and is more than counterbalanced by the impasse which confronts those who were bent upon the passage of the Bonus Bill. The ship subsidy bill is the next measure to which the opponents of group selfishness must address themselves. A cursory examination of it indicates that in the end it will probably cost the Government more than it hopes to obtain for the ships whose sale it is expected to make possible.

There are, however, relatively minor matters. The important fact is that the winter of our discontent is nearly ended and that we have reason to hope that the summer will be made glorious by the sunshine of confidence and prosperity.

The Trend of Business Improvement—Plants Resuming

The Woods-Evertz Stove Co., Springfield, Mo., has resumed operations at its plant, following a shut down since last November. Employment will be given to about 125 men.

The Cox-Lite Co., Perkasie, Pa., manufacturer of automobile equipment, is operating on a capacity schedule and has booked orders insuring maximum production practically throughout the year.

The Jordan Motor Car Co., Cleveland, Ohio, has placed its plant on a full capacity operating schedule.

The Somerville Iron Works, Chattanooga, Tenn., manufacturer of cast-iron pipe, etc., is maintaining a full-time operating schedule at its plant in the North Chattanooga district.

The Bessemer and Lake Erie Railroad Co., has reopened its shops at Greenville, Pa., following a period of curtailment. Practically all old employees have been taken back.

The Kansas City Nut and Bolt Co., Kansas City, Mo., will increase its production schedule at once. The plant has been operating at close to 50 per cent of normal.

The Steel Products Co., 2,196 Clarkwood Road, Cleveland, Ohio, is adding to the working force at its local plant and since the first of the month about 100 men have joined the force. Employment is now being given to about 400 operatives.

The Pere Marquette Railway Co., Detroit, Mich., will expend over $4,000,000 during the present year for extensions and betterments. A contract for 500 freight cars for automobile transportation has been awarded to the Western Steel Car and Foundry Co., Chicago, Ill., at a cost of about $850,000. Plans are under way for the construction of new car shops on a site to be announced later, and purchase of approximately 15,000 tons of steel rails, estimated to cost about $900,000, will soon be made.

The Sharon Steel Hoop Co., Sharon, Pa., has placed four additional mills in service at its plant, with adoption of a full-time working schedule in the finishing department for the first time in eight months.

The Richardson & Boynton Co., Dover, N. J., manufacturer of stoves, ranges, etc., will transfer a large portion of local work to its plant at Buffalo, N. Y., where operations will be increased to provide for the change. This arrangement is being made because of labor troubles at the Dover works.

The Bethlehem Shipbuilding Corporation, Ltd., is arranging for an increase in the working force at its Harlan Works, Wilmington, Del., and about 200 men will be added. The company has taken an order from the Philadelphia and Reading Railroad Co., for fifty steel passenger cars and production will be carried out at the local yard.

The Dodge Brothers Co., Detroit, Mich., manufacturer of automobiles, has placed its recently completed closed body plant in service, and operations will be maintained at capacity.

The Page Harshey Co., Welland, Ont., Canada, resumed operations at its local steel pipe mills on Feb. 13, following a period of curtailment. Employment will be given to about 300 men, under day and night schedule.

The International Silver Co., Meridan, Conn., is increasing the operating time at its plant at Wallingford, Conn., to a 13-hour day schedule, as against a previous 9-hour day.

The Royal Typewriter Co., Hartford, Conn., has increased production at its plant, effective Feb. 13, placing practically all operating departments on a full-time basis.

The Pennsylvania Railroad Co., is arranging for full time operations at its shops at Altoona, Pa., which have been on a curtailed schedule for a number of weeks past. The working force is being increased at the car shops of the road at Trenton, N. J., and about 135 additional men have resumed during the past fortnight, including machinists, pipe fitters, boilermakers, sheet-metal workers, blacksmiths and helpers.

The Mullins Body Corporation, Salem, Ohio, manufacturer of automobile bodies, is increasing operations and adding to the working force at its plant. About 400 men have been added recently in the different departments, and present capacity, with the new plant in service, is about 75 per cent greater than in 1920.

The Philadelphia and Reading Railroad Co., Philadelphia, Pa., has placed an order for 2,500 coal cars, equally divided among the Standard Steel Car Co., the Pressed Steel Car Co., both of Pittsburgh, Pa.; the Midvale Steel Co., Philadelphia, Pa.; and the American Car and Foundry Co., New York.

The Marietta Casting Co., Marietta, Pa., manufacturer of iron and steel castings, is planning for the immediate resumption of operations at its foundry, following an extended period of curtailment.

The Chattanooga Plow Co., Chattanooga, Tenn., is maintaining an active production schedule at its agricultural implement works, with full operating force.

The Erie Railroad Co., New York, has concluded arrangements with the Hornell Repair and Construction Co., Hornell, N. Y., now operating the local shops of the road under lease, for the management of its car and locomotive shops at Salamanca, N. Y., and Bradford, Susquehanna and Brookwayville, Pa. A lease will be taken on the plants and operations placed under way at once for contract work for the railroad. A similar arrangement has been made with Charles Wagner, 144 Pavonia Ave., Jersey City, N. J., for the operation of the local shops of the road. The plant will be operated for contract work and employment will be given to about 400 men.

The Columbia Rolling Mill, Marietta, Pa., resumed operations at its plant on Feb. 15, following a shut down of about one year.

The Acme Wire Co., New Haven, Conn., is increasing production at its plant at Hamden, near New Haven, and making additions in the working force. Over 100 men have been added during February.

Mining and Metallurgical Engineers Elect Col. Dwight

Col. Arthur S. Dwight, of New York, was elected president of the American Institute of Mining and Metallurgical Engineers at its annual convention held in New York City on Feb. 20 to 23. Col. Dwight's election was announced at a business meeting which opened the 125th meeting of the institute. More than 1,000 engineers from all parts of the world attended the convention, which was held at the Engineering Societies Building. The world's oil reserves in relation to America's future supply was the leading topic of discussion.

J. V. W. Reynders and A. R. Ledoux, both of New York, were elected vice-presidents and directors of the institute. Other directors chosen were: Charles F. Rand and George D. Barron, of New York; William H. Basset, Waterbury, Conn.; Thomas B. Stearns, Denver, Col.; and William Kelly, of Vulcan, Mich.

Mining men from the Butte, Anaconda and Arizona regions and from the coal producing states of West Virginia, Pennsylvania, Ohio and Illinois thronged the sessions to hear discussion on conditions in the nation's great mining industries. Abstracts of some of the papers presented will appear in later issues of AMERICAN MACHINIST.

National Board Hits at "Outlaw" Unions

The Associated General Contractors of America, the American Institute of Architects, the Engineering Council, the National Building Trades Employers Association, and the building trades department of the American Federation of Labor through the "National Board for Jurisdictional Awards," which has just concluded its regular quarterly meeting in Washington, have reached a national agreement through a resolution heavily penalizing union workmen who refuse to abide by the decisions of the board.

The resolution provides that local building trade councils of union labor shall suspend unions and refuse to recognize or support those unions which refuse to abide by decisions of the national board; it also provides that general contractors and sub-contractors who employ only union labor shall incorporate in their agreements with labor a provision that will secure compliance with all the decisions of the board and that they shall refuse employment to members of local unions which do not abide by such decisions, and further that architects and engineers shall insert in all their specifications and contracts a clause that such decisions shall be followed.

This action was taken as the result of the report of a special committee of the national board appointed to outline the procedure to be followed in clearing up the situation created by the refusal of the United Brotherhood of Carpenters and Joiners to conform to the decisions of the board in the case of settling the dispute between the carpenters and the sheet-metal workers which was decided in favor of the latter.

Cleveland Letter

Gear manufacturers in the Cleveland, (O.) district were busier during the last week or so than they had been for several months. Increased demand from the automotive industry is largely responsible for this. The Van Dorn-Dutton Company believes it has a goodly portion of the gear orders from this source, and in addition is building equipment for road making machinery, for the printing industry and the like. Most orders are small, but more frequent, and most calls are for immediate delivery.

The Grant-Lees Gear Company is working close to normal capacity, and reports several orders booked for months ahead of delivery. The Union Rolling Mills of the Bounne-Fuller Company are speeding production, based upon new orders from the automobile trade for semi-finished material.

The White Company has started the production of a rail motor car chassis, upon which will be placed car bodies seating up to 40 passengers made by the J. G. Brill Company, of Philadelphia. The completed cars, the White officials assert, will be used for branch railroad line service. A test of the car has already been made by the Baltimore & Ohio Railroad, between Philadelphia and Wilmington.

The opening of locomotive repair shops of the Toledo & Ohio Central Railroad, at Bucyrus, Ohio, and also at Kenton, Ohio, on March 1, was announced by rail officials. These plants have been closed for several weeks. Close to 300 men will be re-employed. Plans do not call for the opening of the car repair shops at this time.

Fire damaged the plant and stock of the Gabriel Manufacturing Co., Cleveland, Ohio, to the extent of $23,000. The origin of the blaze has not been determined. Resumption of operations at an early date is planned by plant officials.

Plans for a new sugar refinery at Shanghai, China, were announced by officers of the China National Sugar Refining Co. of that city, who were in Cleveland, Ohio, this week. Principal reason for the visit was a study of the local market for equipment for the proposed plant, they explained. The officers also stated they were seeking an American engineer to direct operations, and wanted nothing but American machinery. The company is capitalized at $5,000,000.

Warning!

The following letter was sent to the general manager of the National Machine Tool Builders' Association by a New England member:

"On Feb. 8, we were visited by a man who presented a card bearing the following inscription:

MEMBER A.S.M.E.
R. C. CANNON, M. E.
MILWAUKEE, WIS.
PLANT ENGINEER,
PAWLING & HARNISCHFEGER CO.

As we have done business in the past with the above company, the bearer of the card was duly received as an accredited representative of Pawling & Harnischfeger. He claimed to be interested in behalf of his company in investigating other of our machines, and spent the entire day with us.

On his arrival, he informed us he had left a package of blueprints he had brought for our consideration on the train and in addition a wallet containing the most of his money, also important papers. He had, however, a certified check drawn on the West Allis Bank, West Allis, Wis., which we agreed to cash for him.

After his departure and at his request, we forwarded in his name to Pawling & Harnischfeger Co. circulars and other data relating to the matters he discussed with us. We have just received a letter from Pawling & Harnischfeger acknowledging receipt of the circulars and our letter addressed to R. C. Cannon, care of, Pawling & Harnischfeger; from which it is evident that the man is an imposter. In addition, the certified check which we cashed is declared a forgery by the West Allis Bank and returned to us.

We thought it advisable to inform you at once regarding this matter, as you might, under the circumstances, wish to take some action in regard to placing other members on their guard against this party."

The general manager of the association states that the same fraud has been heard of in Cincinnati, and evidently is making the rounds of the machine tool builders. Also that any member approached by him should hold him for the police, have him arrested for forgery and immediately notify the office of the National Machine Tool Builders' Association, Room 817 Provident Bank Building, Cincinnati, Ohio.

Chicago Letter

There is no doubt that February business in the local machine tool market will prove better than that of January. A few concerns report February business as double that of any month for sometime past, and stated that January was one of the very poorest months.

All dealers report inquiries as increasing in number, and buying is slowly but surely becoming more frequent. One of the dealers sold a large order to the Board of Education of Hammond, Ind., amounting to about $15,000. Auction sales, which continued throughout the months of depression, have been very quiet, none being held recently. There is a report that the equipment of the Obenberger Drop Forge Co., Milwaukee, Wis., will be sold soon to satisfy the claims of creditors.

Prospective buyers are thought to be keeping in the background, expecting the dealers to reduce prices.

A little more hope is being placed in the future buying of the railroads. The Pere Marquette is expected to issue a list soon calling for about $100,000 worth of machinery and shop equipment. The Sante Fe has added two new machines to its list, one Atkins No. 7 power-driven bandsaw, or equivalent, and one Fay & Egan No. 62 universal wood-working machine, arranged for belt drive. There is also a report that the East St. Louis & Suburban R.R. is in the market for one large wheel press.

About six months ago Leon E. Stanhope architect, 58 West Madison St., announced that he was making preliminary plans for a local concern to erect a twenty-one story garage building on the southeast corner of Wabash Ave., and South Water St. A few weeks ago Lamb & Ruth announced they would be the engineers on a $2,000,000 twenty-five story garage to be erected on a site about half a block south of the first big garage project. Giaver & Dinkelberg are the architects and announce that plans and specifications will be completed in about ninety days. The National Automobile Hotel Co. is the owner.

Cleveland's Industrial Association

The Industrial Association of Cleveland was organized a few years ago as an "alliance of Cleveland employers and employees, with club rooms where men and management might get together, to study and discuss problems of mutual interest, to meet on equal terms, to get acquainted with one another, and to join together for constructive thinking." With this idea sincerely and honestly carried out, the Industrial Association has developed into an educational and social institution where in open forum, in classes, lecture meetings and discussion groups, solutions of industrial and business problems are sought through democratic exchange of view points.

The association maintains well appointed club rooms in one of Cleveland's hotels. Chess, checkers, cards and pool games, books and magazines, daily luncheon service in the club mezzanine, Saturday night dances and weekly social activities are among the social advantages offered by the association. Men and women are listed in the membership, from the president of the Chamber of Commerce, to the men in the shop.

This winter the association has offered to its members an unusual business training course. Sixteen of Cleveland's leading business men were prevailed on to give one lecture each, in a course which covered the elements of business building and constituted a comprehensive survey of modern business organizations and methods. Special groups of members, also unite to discuss mutual problems. There is a salesmen's club called the "50-50 Club," "The Faneuil Club" for those interested in becoming effective speakers, and the "Efficiency Club," each of which offers opportunity for members.

Chamber of Commerce Votes Down Soldier Bonus for Third Time

A referendum vote among members of the Chamber of Commerce of the United States upon the proposal that a cash bonus be given former service men, has resulted in a 72 per cent majority against the suggestion. This is the third time that the chamber has gone on record as opposed to the cash bonus.

The following are results of votes taken at the same time with that on the bonus:

Upon the suggestion that a national system of reclamation be initiated through adequate Federal appropriation for affording former service men opportunity to cultivate the soil: For, 1,249; against, 452. Carried.

Favoring national legislation and appropriations to enable former service men to build homes: For, 1,022; against, 668. No decision.

Favoring national legislation and appropriations to enable former service men to obtain vocational education: For, 1,378; against, 316. Carried.

Business Items

The Medart Patent Pulley Co., Inc., of De Kalb Avenue, St. Louis, Mo., has changed its name to the Medart Company. This change in name does not indicate any change in the organization, but is simply to correct a misleading impression that the company manufactured nothing but pulleys.

The Savage & Winter Co., machine tool and electrical machinery dealers, has moved from Minneapolis to 914 Pioneer Bldg., St. Paul, Minn.

The A. Z. Boyd Co., 126 Chambers St., New York City, has taken the agency in that city for the sale of the line of screwplates made by the Russell Manufacturing Co., of Greenfield, Mass.

Monaghan Bros. & Co., Newark, Ohio, has leased the foundry of the Scheidler Machine Co., in that city and will start operations as soon as new machinery has been installed.

The Chicago Flexible Shaft Co., of Chicago, Ill., has reopened its St. Louis office. J. J. Wittenburg is in charge. The office is located in the Railway Exchange Bldg.

The Gilson Manufacturing Co., Port Washington, Wis., has purchased the plant and equipment of the Globe Metal Products Co., in Sheboygan, Wis. The Gilson company will operate both plants.

Charles E. Skelton, formerly of the Skelton-Chapin Co., Syracuse, N. Y., has severed his relations with that concern and has organized a company under his own name. A machine shop has been opened at 4,025 So. Salina St., where experimental and development work on machinery will be carried on.

The Brazil Trust Co., Brazil, Ind., has been appointed receiver for the Union Steel Co., of that city, manufacturer of tools and automobile parts. The Union Steel Co. moved its plant from Chicago just a year ago. Walter H. Miller, superintendent of the company, will be placed in charge to operate the plant.

Consolidation of the Hesse-Martin Iron Works and the Ersted Machinery Manufacturing Co. has been accomplished. The consolidated foundry and machinery business will operate at the plant of Hesse-Martin, 468 East Taylor St., Portland, Ore., which will be enlarged and improved.

The McMullen Machinery Co., 64-66 Ionia Ave, Grand Rapids, Mich., has been appointed exclusive representative, by the Diamant Tool and Manufacturing Co., Inc., 91-97 Runyon St., Newark, N. J., in connection with the sale of Diamant standard punch and die sets in the Michigan territory.

The C. G. Garrigus Co., Haddam, Conn., has been organized and incorporated under the laws of Connecticut to manufacture and deal in machinery, hardware and tools. The capital stock is $50,000 and the incorporators are Clarence G. Garrigus, 105 High St., Bristol, Conn.; A. C. Garrigus, Tylerville, Conn., and H. L. Webster, Waterville, Conn.

H. D. Smith & Co., manufacturer of tools, Plantsville, Conn., has filed a certificate with the Secretary of the State of Connecticut, to increase the capital stock of the company from $200,000 to $300,000.

At the recent meeting of the directors of the American Brass Co., Waterbury, Conn., and Ansonia, Conn., the following officers were elected for the ensuing year: Chairman of the board, C. F. Brooker; vice-chairman and first vice-president John P. Elton; vice-presidents, Edward L. Frisbie, Thos. B. Kent and Gordon W. Burnham; treasurer, Clifford F. Hollister; assistant treasurers, Major W. Judge and A. Bernham Terry; secretary, Edmund H. Yates; assistant secretary, Elton S. Wayland. Executive committee: Charles F. Brooker, Edward L. Frisbie, Thomas B. Kent, John P. Elton, Gordon W. Burnham, John A. Coe, George H. Allen, Clifford F. Hollister, John D. Ryan, Cornelius F. Kelley and Benjamin B. Thayer.

The Springfield Realty Corporation has been formed with $400,000 capital to take over and hold the real estate of the Van Norman Tool Co., Springfield, Mass. The charter carries the right to issue bonds.

The Norwood Engineering Co., Florence, Mass., has been reorganized with G. Wilson MacDow, of Boston, as the principal owner. No radical change will be made in the lines of the business. The new officers are: President and treasurer, Warren M. King; vice-president and general manager, H. W. Hosford; clerk, H. B. Haven; assistant treasurer, G. Wilson MacDow; directors, H. P. Otis, L. C. Perrin and R. N. Smithers.

The business formerly conducted by Carl H. Swartz, at Freeport, Ill., under the name of the Swartz Iron Foundry, has been incorporated and will be known as the Swartz Manufacturing Co. Inc., in the future. A machine shop has been erected and for the time being the company will devote its energies to the manufacture of semi-lightweight pistons for the replacement trade. A full line of pistons for practically all makes of motor cars, tractors and commercial motors will be included.

The Fulton Machine and Vise Co., Lowville, N. Y., has gone into bankruptcy.

The American Brass Co., of Waterbury, Conn., has been merged with the Anaconda Copper Mining Co. of Montana. The companies will retain their separate officers and organizations.

The Blake Nut-Lock Co. has been incorporated at Buffalo, N. Y. Capital stock is given as $500,000; directors are George J. Blake, A. C. Blake, W. J. Bauman, G. W. Schworm and E. D. Dole.

The Clinton Supply Co., Inc., 110 S. Clinton St., Chicago, Ill., has been designated to handle Royersford products and the Sells roller-bearings, made by the Royersford Foundry and Machine Co., of Royersford, Pa.

The Chapman Valve Manufacturing Co., Indian Orchard, a suburb of Springfield, Mass., is planning to construct about twenty-five more houses for its workmen near the plant in Indian Orchard.

The Terre Haute Boiler Works at Terre Haute, Ind., will start operations at full capacity in a few weeks. New machine equipment has been installed and about sixty workmen have been employed for the present.

Personals

J. B. DOAN, retiring president of the Cincinnati branch of the National Metal Trades Association, was tendered a complimentary dinner on Feb. 17 by the executive committee of the organization. Mr. Doan was presented with a silver service.

W. B. MCSKIMMON, secretary of the S. W. Card Manufacturing Co. division of the Union Twist Drill Co., Athol, Mass., was given a dinner by a group of his friends on March second, which was the fiftieth anniversary of his birth.

WILLIAM R. WEBSTER, vice-president of the Bridgeport Brass Co., Bridgeport, Conn., was elected a director of the Automatic Machine Co., machinery manufacturers, of that city.

PHILIP MCKENNA, of Bridgeport, Conn., recently left on a business trip into Mexico, in the interests of the Crane Company, of Chicago.

PETER F. AUGENBRAUN, who will have charge of the new Yale & Towne Manufacturing Co.'s plant in Germany, sailed from New York on Feb. 4. Mr. Augenbraun, who has been with Yale & Towne for the past thirty years, was tendered a farewell dinner at the home plant in Stamford, Conn., just before he left, and was presented with a handsome gift from his associates.

M. A. HERALD, of Pittsburgh, Pa., has joined the general sales department of the Gilbert & Barker Manufacturing Co., Springfield, Mass., as western Pennsylvania representative, with headquarters at Pittsburgh.

JOHN T. SLOCOMB, formerly of J. T. Slocomb Co., Providence, R. I., who sold out his interests in that company almost two years ago, now holds chief interest in and is manager of the Economy Cooker Co., Providence, R. I., manufacturer of a steam pressure cooker made of monel-metal.

C. F. BLISS, president of the Farrel Foundry and Machine Co., Ansonia, Conn., was elected a director of the Ansonia National Bank at the recent annual meeting.

LESTER G. SIGOURNEY, has been elected secretary of the New Departure Manufacturing Corporation, Bristol, Conn. Mr. Sigourney has been with the company for a number of years.

EBENEZER HILL, has resigned as president of the Norwalk Iron Works, South Norwalk, Conn.

HENRY D. SHARPE, president and treasurer of the Brown & Sharpe Manufacturing Co., Providence, R. I., manufacturers of machinery and tools, has been elected vice-president of the Providence Journal Co., publishers of the *Providence Journal*.

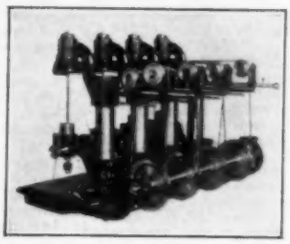
E. D. MITCHELL, who has been American manager of Alfred Herbert, Inc., and who is returning to the home office in Coventry, England, was given a testimonial dinner on March second at the Engineers Club, New York. He was presented with a silver token.

R. L. WHITE has been appointed district manager in charge of the Detroit office of the Wilson Welder and Metals Co., of New York.

Condensed-Clipping Index of Equipment

Patented Aug. 20, 1918

Drilling Machine, Bench, Class-O
Henry & Wright, Hartford, Conn.
"American Machinist," Oct. 6, 1921



This high-speed drilling machine is intended for driving 13/64-in. drills to their full capacity. The machine is equipped throughout with ball bearings and has a maximum speed of 12,000 r.p.m. Two-step pulleys provide four changes of speed. The weight of the spindle is over-balanced by a short coil spring on the pinion shaft, thus providing for a quick return and serving to prevent the breakage of drills when "breaking through" the work. The machine is ordinarily built with four spindles, spaced 7 in. apart. The distance from each column to the center of its spindle is 5¼ in.

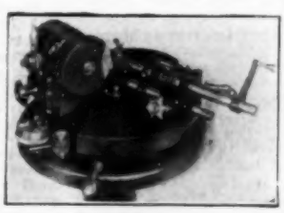
Bending Machine, Pipe, No. 5-B
Wallace Supplies Manufacturing Co., 420 Orleans St., Chicago, Ill.
"American Machinist," Oct. 6, 1921

The machine is known as the 5-B, being adapted especially to the bending of pipe and tubing. It is known as the No. 5-C when equipped with dies for the bending of angles, channels, tees and other structural shapes. The mandrel which supports the walls of the tubing from the inside during the process of bending may be quickly inserted and removed. When bending tubing heavier than 1/16 in. wall thickness, the inside mandrel may be dispensed with, and the forming done by means of the outside follower bar only. Forming dies or heads up to 50 in. in diameter may be used. Floor space, about 52 x 66 in. Net weight, 1,200 pounds.

Cushion, Spring, Punch-Press, Even-Pressure
Marquette Tool & Mfg. Co., 319 W. Ohio St., Chicago, Ill.
"American Machinist," Oct. 6, 1921

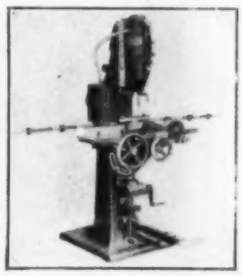
This cushion is for giving a uniform pressure during the entire length of the stroke when drawing a shell on a punch press. It is stated that sufficient pressure is obtained at the beginning of the draw to eliminate the wrinkling of the metal and the unnecessary wear on the dies resulting therefrom. By doing away with the increased pressure toward the bottom of the stroke, backlash of the press is eliminated. The adjustment is left undisturbed when the attachment is removed from the press. The device is attached to the press by means of a single bolt. The attachment takes up very little room under the bed of the press.

Grinding Machine, Tap
Bickford-Switzer Co., 50 Norwood St., Greenfield, Mass.
"American Machinist," Oct. 6, 1921



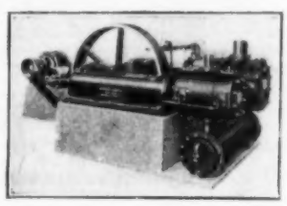
The machine is similar in appearance to the company's drill grinding machine. It is intended to sharpen taps having any number of lands or flutes from two to six, by grinding an eccentric relief on top of the cutting land. The limit of the capacity is 1½ in. diameter for hand taps, 1¼ in. for tapper or machine nut taps, and 2 in. for pipe taps. A cam on the main or work-carrying spindle causes the tap to approach and recede from the wheel as it is revolved. The machine can sharpen countersinks and chucking reamers having not more than six flutes. It is equipped with a ¼-hp. motor, is mounted on a column and weighs 300 pounds.

Mortising Machine, Hollow-Chisel, Vertical, Motor-on-Spindle
Oliver Machinery Co., Grand Rapids, Mich.
"American Machinist," Oct. 6, 1921



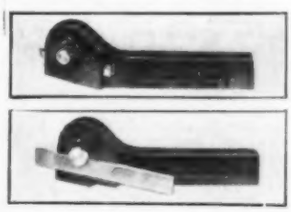
The principal feature of the device is the fact that the motor is mounted directly on the spindle of the machine. The motor operates on either two or three phase, 60-cycle, alternating current at a speed of 3,600 r.p.m. The rotor is mounted directly on the machine spindle, which runs in ball bearings. An inclosed starting switch with fuses is mounted on the machine. The machine is equipped with a compound table having a feed operated by a handwheel through a rack and pinion.

Compressor, Air, "Imperial Type XCB"
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
"American Machinist," Oct. 6, 1921



The machine has plate valves for both the air intake and discharge, and a 5-step clearance control for regulating the output. The compressor is automatically loaded and unloaded in five successive steps through the reduction of or the addition to the clearance space of the air cylinders. The machine can be furnished single-stage for low pressures and two-stage for higher discharge pressures. The compressor can be furnished with a short-belt driving attachment employing a floating idler, thus decreasing the length of the belt and the floor space required.

Toolholders, Spring
Willard Tool Co., Inc., 105 East Main St., Stratford, Conn.
"American Machinist," September 15, 1921



The holder is made of drop-forged steel, and is hardened to a spring temper. The "goose-neck" is formed by means of a saw-cut through the body of the shank. At the top of the illustration is shown the regular form of threading and forming toolholder having a right-hand offset. The toolbit is carried in a square broached hole, and a non-binding clamping device operated from the side is employed to hold it in place. At the bottom of the illustration is the cutting-off toolholder of the right-hand offset type. The cutting-off tool is also made in a right-hand straight style. The device is made in sizes.

[Note: To replace the card previously printed where the address was incorrectly given as Chicago, Ill.]

Grinder, Heavy-Duty, Electric, Ball-Bearing
Van Dorn Electric Tool Co., Cleveland, Ohio.
"American Machinist," Oct. 6, 1921

The machine is equipped with two 14 x 2½-in. face-grinding wheels mounted on the motor shaft. The wheels are inclosed in heavy housings, the ends of which are removable. The toolrests have both horizontal and vertical adjustments. The motor has a normal continuous rating of 4 hp. It is ordinarily furnished to operate at 1,200 r.p.m. on three-phase, 60 cycle, alternating current, of either 220 or 440 volts. The motor housing is smaller in diameter than the grinding wheels. The housing is dustproof, a fan within the motor furnishing ventilation. The spindle is mounted on ball bearings. The motor is started and stopped by means of a pedal at the base. Net weight, about 700 lb.

Clip, paste on 3 x 5-in. cards and file as desired

Book Reviews

Year Book of National Association of Cost Accountants. The book is devoted primarily to recounting the proceedings at the Second International Conference held by the National Association of Cost Accountants at Cleveland in September, 1921. In addition, the members of the association are listed both alphabetically and geographically, and officers of the national association and of the various chapters are given. The reports of all committees are printed in full.

The convention papers with the discussions that followed them occupy the greater portion of the volume. The subject matter is divided into five main parts, that correspond to the five major sessions of the convention. The first is devoted to the subject of interest as an element of cost; the second, to cost systems as a means of preventing waste; the third, to uniform methods and standardized costs; the fourth, to the distribution of overhead under abnormal conditions; and the last to the executive uses of a cost system. The addresses given at the banquet on more general subjects are also printed in full.

The material presented is of considerable scope and value, since it represents the best practice and the best ideas of men actively engaged in the art of cost accounting. The book may serve as a reference volume for the opinions of prominent men on the subjects treated, although, of course, it has not been compiled as a complete treatment of the subjects, such as required for text books. The opinions advanced necessarily represent the lastest ideas and practice of industries, since the papers treat of the methods being evolved to meet current problems.

Ryerson Journal and Stock List. Published by Joseph T. Ryerson & Son, Chicago. $1.00 per year.

This is the outgrowth of "Ryerson's Monthly Stock List" and now includes a thirty-page magazine section. Increased space is thus available for new steel products. The stock section is thumb indexed for convenient reference. It is issued bimonthly and has much of interest to buyers generally.

The Airplane Engine. By Lionel S. Marks, B.Sc. M. M. E., 454 pp. 6 x 9 in., 341 Illustrations. Published by McGraw-Hill Book Co., New York, N. Y. Price $5.

Beginning with a chapter on the power required to drive airplanes and showing plane resistance, propeller efficiencies, variations in engine and propeller torque, etc., the author goes by logical steps to the last chapter on potential developments.

Typical airplane engines are shown under engine efficiencies and capacities and also under dimensions and arrangements. These include American, British, French, German and Italian motors in considerable detail. Engine efficiencies include volumetric capacity, fuel mixtures, air temperatures, throttling, compression ratio, jacket water temperature and other considerations. A chapter on engine dynamics takes up problems of torque, side thrust, offset cylinders, balancing and other features of both stationary and rotating cylinder engines.

The chapter on engine details is of special interest as it includes cylinders, wall thickness, valves, pistons, connecting rods, crankcases and propeller hubs. Valves and valve gears include location and arrangement as well as the shape of valves used; valve materials and operation are also discussed while cams and cam followers, valves springs and rockers also receive attention.

Radial and rotary engines are shown in considerable detail and are always interesting as examples of design. This chapter also takes up the question of air-cooled cylinders of different construction. It points out that a steel cylinder with an aluminum head cast in place makes an extremely efficient combination. Water cooling systems are treated in a separate chapter.

Fuels, carburetors, fuel systems, ignition and lubrication all receive careful attention, all being very important items in engine design and operation. Here again the leading engines from various countries are shown and attention called to various details.

Geared propeller drives, supercharging devices, manifolds, mufflers and starting devices are taken up in detail, making the whole book of extreme value to either designers or builders of engines for airplane service. The author credits the researches of the various governments, resulting from the developments of the war, for much of his material. He has however utilized his wide experience and activity in this line to good advantage in making his selection and the result is a distinct addition to a field in which accurate and concise knowledge is necessary.

An Investigation of Oxyacetylene Welding and Cutting Blowpipes. Technologic paper No. 200, of the Bureau of Standards, Department of Commerce, by Robert S. Johnston. Complete copy of the paper may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C. Price 35 cents.

At the request of the War Department, the Bureau of Standards conducted an investigation of the operation, efficiency and safety of oxyacetylene welding and cutting blowpipes. Apparatus from fourteen different manufacturers was submitted to test. All welding blowpipes were submitted to welding tests on ½-in. and ¾-in. metal. During the cutting tests the blowpipes were operated at the maximum speed at which they would cut metal of specified thickness; ½-in., 2-in., 6-in. and 10-in. metal was used in the cutting tests. The results of the initial series of tests indicated that there are some phenomena in connection with the operation of a welding blowpipe that are not clearly understood. A very thorough study of the design of the various pipes was therefore made and certain conclusions relative to the cause of the inconsistencies in action were noticed. Another series of tests was then carried on to prove the correctness of the first conclusion. The results of the entire investigation are summarized in the paper.

Pamphlets Received

Pressure Distribution Over the Horizontal Tail Surfaces of an Airplane—II: By F. H. Norton and D. L. Bacon of Langley Field, Va., for the National Advisory Committee for Aeronautics. Published by the Superintendent of Documents, Government Printing Office, Washington, D. C. The results of an investigation undertaken by the aerodynamic staff of the committee to determine the load distribution on tail surfaces of airplanes and to find the distribution of the load when large elevator angles are used. A model airplane was constructed, having aluminum wings and wooden fuselage. The tests were made in a specially constructed air tunnel in which the plane was supported on a spindle.

Investigation of the Fatigue of Metals: Bulletin No. 124 of the engineering experiment station, University of Illinois, Urbana, [illegible]. A progress report of an investigation to determine whether or not there exists any clearly defined relation between static properties and ability to resist repeated stresses. Copies of this bulletin, showing the results of the tests, can be had from the experiment station.

Trade Catalogs

Detectorod. Bennett Metal Treating Co., Elmwood, Conn. Small four-page circular describing the Bennett detectorod for determining the atmospheric condition of a steel heating oven.

Sundh Cable Drawbench. Sundh Engineering and Machine Co., 1105 Frankford Ave., Philadelphia, Pa. A four-page circular illustrating and describing a reversing drawbench for producing rods, tubes, moldings and bars of various shapes.

Ball Bearings. New Departure Manufacturing Co., Bristol, Conn. Large single-page circular containing names of automobiles, trucks and tractors in which N. D. ball bearings are used.

Northern Hoists. Northern Engineering Works, 210 Chene St., Detroit, Mich. A fifteen-page bulletin showing several types of Northern cranes and hoists in operation.

Diamonds Used in Tools. Arthur A. Crafts & Co., 125 Summer St., Boston, Mass. Catalog No. 22, thirty-two pages devoted to illustrations and descriptions of all kinds of diamond cutting tools, their manufacture and use.

Straightening Press. The P. A. Geier Co., Cleveland, Ohio. Circular illustrating and describing the latest press, designed to straighten without removing from centers.

Export Opportunities

The Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. S., has inquiries for the agencies of machinery and machine tools. Any information desired regarding these opportunities can be secured from the above address by referring to the number following each item.

The representation of firms is desired by a company in Spain for the sale of automobiles and accessories. Quotations should be given f.o.b. New York. Correspondence should be in Spanish. Reference No. 801.

A mercantile firm in India wishes to secure the representation on a commission basis of firms dealing in hardware, such as nails, wires, nettings, bolts, nuts, screws, hinges, rivets, butts, padlocks, hooks, and furniture mountings; mason's, carpenter's, and goldsmith's tools. Quotations are requested, including return commission and interest. Terms: Payment against documents in India. Reference No. 832.

A request has been received from an importer and commission agent in India for quotations on machinery, electrical apparatus, hardware, enameled ware, wire fencing, vises, anvils, tool steel, spring steel, mild steel bars and plates; mild steel angles; rolled steel beams; galvanized, corrugated, and plain iron sheets; brass and copper sheets and rods; brass and copper pipes; steel, galvanized, and wrought-iron pipes; boiler pipes and fittings; motor cars, motor cycles, and parts. Reference No. 744.

A railway company in Mexico wishes to purchase 230 boiler tubes, and knobbled charcoal iron, 2 in. outside dimensions, 11 ft. 6 in. long, 13 gage. Quotations should be given c.i.f. El Paso, Tex. Reference No. 808.

An industrial association in Italy desires to purchase agricultural implements and machinery. Quotations should be given c.i.f. Genoa or Leghorn. Correspondence should be in Italian. Reference No. 804.

A mercantile firm in England desires to purchase and secure an agency for the sale of motor cars, lorries, trucks, engines, lamps, and all automobile parts and accessories. Quotations should be given c.i.f. Hull. Reference No. 796.

An engineer in Norway desires to secure an agency for the sale of street and road making machinery; zincked fencing materials; iron and steel wire; glowed iron wire and hooped wire for packing; copper wire for electrical use; copper plates and pipes; perforated copper and metal plates; galvanized corrugated iron; etc. Refernce No. 675.

A firm of importers in Sweden wishes to purchase iron and steel. Quotations should be given c.i.f. Karlskrona. Payment: Cash against documents in Swedish bank. Reference No. 671.

A firm of importers in Italy wishes to purchase and secure an agency for the sale of agricultural machinery and implements. Quotations should be given c.i.f. Leghorn or Genoa. Reference No. 707.

Forthcoming Meetings

American Society for Steel Treating: Sectional meeting, New York City, Mar. 3, Hotel McAlpin, 34th St. & Broadway. W. H. Eiseman, secretary, 4600 Prospect Ave., Cleveland, Ohio.

Taylor Society: Mid-winter meeting, Philadelphia City Club, Philadelphia, Pa., March 16, 17 and 18. Secretary's headquarters, 29 West 39th St., New York City.

National Metal Trades Association: Annual convention April 17 to 20, Hotel Astor, New York City. H. W. Fisher, 1022 Peoples Gas Building, Chicago, Ill., secretary.

Southern Supply and Machinery Dealers Association: Annual meeting April 24, 25 and 26, Birmingham, Ala. A. M. Smith, secretary.

National Research Council: Annual meeting of executive board, April 26, Washington, D. C. A. D. Flinn, 29 West 39th St., New York City, chairman.

Society of Industrial Engineers: Annual meeting April 26, 27 and 28, Detroit, Mich. G. C. Dent, 327 La Salle St., Chicago, Ill., business manager.

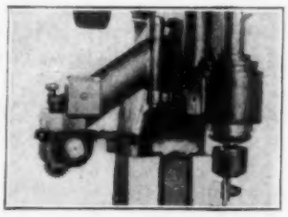
Condensed-Clipping Index of Equipment

Patented Aug. 20, 1918

Cherrying Attachment, Die-Sinking Machine

Pratt & Whitney Co. Hartford, Conn.

"American Machinist," October 6, 1921.



By means of this attachment a formed cutter may be sunk in the metal to be worked, to a depth practically equal to its own radius. The attachment is in the form of a swinging bracket permanently attached to the side of the column of the machine, and when not in use is swung out of the way, as shown. The peripheral teeth of the cutters are made of such form that the back of each tooth corresponds to the working face of a gear tooth; and the cutter is driven from its periphery by means of a pinion. The device is not intended for use in sinking an impression in solid metal, but is rather for bringing such an impression to the exact final form. Cutters from 1 to 6 in. in diameter may be used.

Drilling Machine, Bench, Electric, Portable

Model Specialty Co., 401 East 19th St., New York, N. Y.

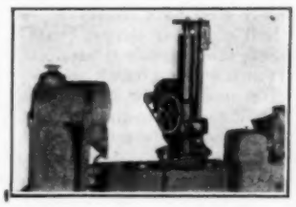
"American Machinist," October 6, 1921.

The machine is intended for all-around shop use where a small bench drill is adaptable. Due to its light weight, 34 lb., it is very easily carried. The round column fastened to the base is high enough to permit of drilling objects 18 in. in height from the base of the machine. The table is 5 in. in diameter, can be adjusted vertically on the column, and tilted to any angle desired. The head can be positioned at any point of the column. The spindle slides vertically in the hollow armature shaft. The feed is actuated by a small lever through a rack and pinion, the spindle traveling 1¾ in. The motor is of the shunt type, operating at 1,800 r.p.m. on 110 volts. It is large enough to drill holes up to ¼ in. in diameter in steel. A Jacobs chuck is furnished.

Boring Machine, (Re-), Cylinder, Motor-Driven

Storm Manufacturing Co., 6th Ave. and 4th St., So., Minneapolis, Minn.

"American Machinist," October 13, 1921.



The device is adapted to use on practically all types of automobile and tractor engines. It is suitable for reboring motor cylinders with the motors still in the chassis, as shown. When boring cylinder blocks detached from the automobile, a heavy base is provided for mounting the machine. The capacity of the machine is for cylinder diameters from 2⅝ to 6 in. A burnishing head can be furnished. The machine weighs approximately 300 lb.

Regulator, Gas Pressure, American

Alexander Milburn Co., 1420 W. Baltimore St., Baltimore, Md.

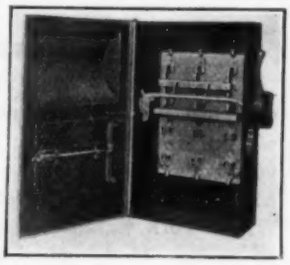
"American Machinist," October 13, 1921.

The regulator is intended for the control and delivery of acetylene, oxygen, hydrogen, and other gases under high pressure, such as used in welding. It maintains a constant, predetermined pressure, regardless of fluctuations in the initial pressure line and of variations in the consumption at the torch. The body of the regulator contains a flexible metal diaphragm suitably mounted in connection with a tension spring. In order to adapt the regulator to different types of gas, it is necessary merely to change the gages and the rear connections on it for fitting to the containers.

Starter, Motor, A.C., Small

Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa.

"American Machinist," October 6, 1921.

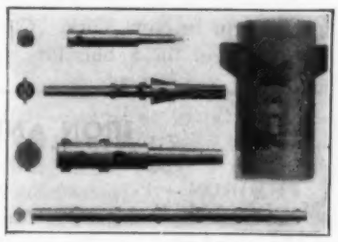


The starter is said to provide complete protection to both the operator and the motor. The starter consists essentially of an enclosed quick make-and-break knife switch, which is operated by an exterior handle. It protects the motor from overloads both when starting and when running, by means of thermal cutouts. All parts are enclosed. The door giving access to the cutouts, cannot be opened unless the switch is in the off position. The WK-30 starters are made in sizes for a.c. motors up to 3 hp. and 110 volts; 10 hp. and 250 volts; or 10 hp. and 600 volts. The type WK-55 starter is similar, but it is made for heavier service.

Boring Bars, Adjustable, Detroit

Firmhil Machine Supply Co., 602 Kerr Bldg., Detroit, Mich.

"American Machinist," October 6, 1921.



The bars are made in three types, the angle adjustable, the straight adjustable, and the removable block, to bore holes from 2 to 15 in. in diameter. They are intended for both rough and finish boring and for reaming. The phantom view shows the construction of the angle type of bar. Various combinations of standard cutters may be incorporated in the same bar. The angle type of cutters is particularly adapted to facing and counterboring operations, because setting out and grinding leaves the forward cutting edge in its original position. The removable block-type cutters are interchangeable in the slots, and the changes can be accomplished without removing the bar from the fixture.

Drill and Valve Grinder, Combination, Portable, "Dumore"

Wisconsin Electric Co., Racine, Wis.

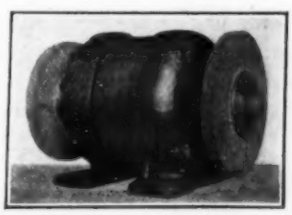
"American Machinist," October 13, 1921.

The device is adapted to drilling holes, grinding motor valves, and to service as a portable grinder and buffer. When carrying a drill or a grinding wheel, the rotation of the spindle is continuous. For grinding automotive valves in place on their seats, a separate attachment is used on the drill, as shown, and an oscillating motion is given to the attachment spindle for driving the valve. A universal motor is used, so that it can be operated by either direct or alternating current. The machine is made in two sizes having capacities in steel of ¼ and ½ in.

Grinder, Bench, Motor-Driven

Forbes & Myers, Worcester, Mass.

"American Machinist," October 13, 1921.



The machine is adapted to general light work, but is especially intended for use on farms where electric current is available. The motor is fully inclosed, so as to protect the windings from injury. Ball bearings are used. The machine operates at 3,600 r.p.m. on 110-volt, 60-cycle alternating current. It can be supplied either in the bench type, as shown, or mounted on a pedestal. The machine is made in two sizes, the No. 42 having a capacity of ¼ hp. and the No. 62 of ⅓ hp. The former carries wheels 6 x ½ in. and the latter 6 x 1 in. in size.

The Weekly Price Guide

THIS WEEK'S MARKET

ALTHOUGH the official Pittsburgh mill price on structural steel shapes, plates and bars continues at $1.40@$1.50, a minimum of $1.40 per 100 lb. is accepted even on comparatively small tonnages. Pig iron market shows somewhat firmer tone, due mostly to increasing demand.

New York warehouses quote electrolytic copper at 13⅝c. as against 14c.; copper and brass sheets, wire, rods and tubing down ¼c. per lb. Lead and zinc markets unchanged; slight recovery in tin. Copper sheets; brass rods and tubing also down ¼c. per lb. in Cleveland. Reductions ranging from ¼c. to 1c. per lb. quoted in dealers' purchasing prices on old metals (non-ferrous).

Advance of 2c. per gal. on raw linseed oil in Chicago; prices firm in New York. Cleveland quotes 99c. as against 85c. per gal. in 5 bbl. lots.

IRON AND STEEL

PIG IRON — Per gross ton — Quotations compiled by The Matthew Addy Co.:

CINCINNATI	
No. 2 Southern	$20.50
Northern Basic	21.02
Southern Ohio No. 2	22.52
NEW YORK—Tidewater Delivery	
Southern No. 2 (Silicon 2.25 to 2.75)	26.26
BIRMINGHAM	
No. 2 Foundry	16.00
PHILADELPHIA	
Eastern Pa., No. 2x, 2.25-2.75 sil	21.76
Virginia No. 2	27.74
Basic	19.84
Grey Forge	21.50
CHICAGO	
No. 2 Foundry local	19.70
No. 2 Foundry, Southern, sil 2.25@2.75	22.67
PITTSBURGH, including freight charge from Valley	
No. 2 Foundry	21.96
Basic	19.96
Bessemer	21.46

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the base quotations from mill:

Blue Annealed	Pittsburgh, Large Mill Lots	New York	Cleveland	Chicago
No. 10	2.25	3.28	3.10	3.38
No. 12	2.30	3.33	3.15	3.43
No. 14	2.35	3.38	3.20	3.48
No. 16	2.55	3.48	3.30	3.58
Black				
Nos. 17 and 21.	2.85	3.80	3.55	3.95
Nos. 22 and 24.	2.90	3.85	3.60	4.00
Nos. 25 and 26.	2.95	3.90	3.65	4.05
No. 28	3.00	4.00	3.75	4.15
Galvanized				
Nos. 10 and 11.	3.00	4.00	3.75	4.15
Nos. 12 and 14.	3.10	4.10	3.85	4.25
Nos. 17 and 21.	3.40	4.40	4.15	4.55
Nos. 22 and 24.	3.55	4.55	4.30	4.70
No. 26	3.70	4.70	4.55	4.85
No. 28	4.00	5.00	4.75	5.15

WROUGHT PIPE—The following discounts are to jobbers for carload lots on the latest Pittsburgh basing card:

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
		BUTT WELD			
1 to 3	71	58½	¾ to 1¼	44½	29½
		LAP WELD			
2	64	51½	2	39½	25½
2½ to 6	68	55½	2½ to 4	42½	29½
7 to 8	65	51½	4½ to 6	42½	29½
9 to 12	64	50½	7 to 12	40½	27½
		BUTT WELD, EXTRA STRONG, PLAIN ENDS			
1 to 1¼	69	57½	¾ to 1¼	44½	30½
2 to 3	70	58½			
		LAP WELD, EXTRA STRONG, PLAIN ENDS			
2	62	50½	2	40½	27½
2½ to 4	66	54½	2½ to 4	43½	31½
4½ to 6	65	53½	4½ to 6	42½	30½
7 to 8	61	47½	7 to 8	35½	23½
9 to 12	55	41½	9 to 12	30½	18½

Malleable fittings. Classes B and C, Banded, from New York stock sell at net list. Cast iron, standard sizes, 20–5% off.

WROUGHT PIPE—Warehouse discounts as follows:

	New York Black	New York Galv.	Cleveland Black	Cleveland Galv.	Chicago Black	Chicago Galv.
1 to 3 in. steel butt welded	66%	53%	60½%	47½%	62½%	48½%
2½ to 6 in. steel lap welded	61%	47%	58½%	44½%	59½%	45½%

Malleable fittings. Classes B and C, Banded, from New York stock sell at list less 10%. Cast iron, standard sizes, 32–5% off.

MISCELLANEOUS—Warehouse prices in cents per pound in 100-lb. lots:

	New York	Cleveland	Chicago
Open hearth spring steel (base)	4.50	6.00	4.50
Spring steel (light) (base)	6.00	6.00	6.00
Coppered Bessemer rods (base)	7.00	8.00	6.03
Hoop steel	3.38	2.96	3.13
Cold rolled strip steel	6.25	8.25	6.50
Floor plates	4.60	4.56	3.40
Cold finished shafting or screw	3.45	3.25	3.40
Cold finished flats, squares	3.95	3.75	3.90
Structural shapes (base)	2.63	2.46	2.63
Soft steel bars (base)	2.53	2.36	2.53
Soft steel bar shapes (base)	2.53	2.36	2.53
Soft steel bands (base)	3.13	....	3.13
Tank plates (base)	2.63	2.46	2.63
Bar iron (2.00@2.10 at mill)	2.68	3.52	2.78
Drill rod (from list)	55@60%	55%	50%
Electric welding wire:			
⅜	8.50		12@13
¼	7.15		11@12
5/16 to ¼	6.75		10@11

High speed steel is quoted in Cleveland at 90c. per lb.

METALS

Current Prices in Cents Per Pound

	New York	Cleveland	Chicago
Copper, electrolytic (up to carlots), New York			13.62½
Tin, 5-ton lots, New York			31.00
Lead (up to carlots), St. Louis, 4.60; New York			5.00
Zinc (up to carlots), St. Louis, 4.77½; New York			5.12½
Aluminum, 98 to 99% ingots, 1-15 ton lots	19.20	20.00	18.00
Antimony (Chinese), ton spot	5.50	6.50	6.75
Copper sheets, base	20.75	21@21.50	23.00
Copper wire (carlots)	14.50	17.00	16.25
Copper rods (ton lots)	19.25	22.00	19.50
Copper tubing (100-lb. lots)	20.75	24.00	23.00
Brass sheets (100-lb. lots)	16.25	17.00	18.75
Brass tubing (100-lb. lots)	18.00	19.00	20.50
Brass rods (1,000-lb. lots)	14.25	15.50	15.75
Zinc sheets (casks), (8% dis. carlots)	10.50	9.15	15.75
Nickel (ingot and shot), Bayonne, N. J.	41.00	.....	.....
Nickel (electrolytic), Bayonne, N. J.	44.00	.....	.....
Solder (½ and ½), (case lots)	19.00	23.50	19.00
Babbitt metal (best grade)	32.00	41.00	36.00
Babbitt metal (commercial)	16.50	13.50	9.00

—Shop Materials and Supplies

SPECIAL NICKEL AND ALLOYS—Price in cents per lb.

Malleable nickel ingots	45
Malleable nickel sheet bars	47
Hot rolled rods, Grades "A" and "C" (base)	60
Cold drawn rods, Grades "A" and "C" (base)	72
Copper nickel ingots	37
Hot rolled copper nickel rods (base)	45
Manganese nickel hot rolled (base) rods "D"—low manganese	64
Manganese nickel hot rolled (base) rods "D"—high manganese	67

Base price of monel metal in cents per lb., f.o.b. Bayonne, N.J.:

Shot	35.00	Hot rolled machined rods (base)	53.00
Blocks	35.00	Hot rolled rods (base)	42.00
Ingots	38.00	Cold drawn rods (base)	56.00
Sheet bars	40.00	Hot rolled sheets (base)	55.00

OLD METALS—Dealers' purchasing prices in cents per pound:

	New York	Cleveland	Chicago
Copper, heavy, and crucible	10.00	10.50	10.50
Copper, heavy, and wire	9.50	10.00	9.50
Copper, light, and bottoms	8.50	8.50	8.75
Lead, heavy	3.75	3.50	3.50
Lead, tea	2.75	2.50	3.00
Brass, heavy	5.75	5.50	8.50
Brass, light	4.25	4.00	5.00
No. 1 yellow brass turnings	5.00	5.00	5.25
Zinc	2.75	2.00	2.50

TIN PLATES—American Charcoal Plates—Bright—Cents per lb.

		New York	Cleveland	Chicago
"AAA" Charcoal Melyn Grade:				
IC,	20x28, 112 sheets	20.00	18.25	18.50
IX,	20x28, 112 sheets	22.50	21.00	20.90
"A" Charcoal Allaways Grade:				
IC,	20x28, 112 sheets	17.00	16.00	17.00
IX,	20x28, 112 sheets	20.00	18.75	19.60
Coke Plates, Bright				
Prime, 20x28 in.:				
100-lb.,	112 sheets	12.50	12.00	14.50
IC,	112 sheets	12.80	12.30	14.80
Terne Plate				
Small lots, 8-lb. Coating:				
100-lb.,	14x20	7.00	5.60	7.25
IC,	14x20	7.25	5.85	7.40

MISCELLANEOUS

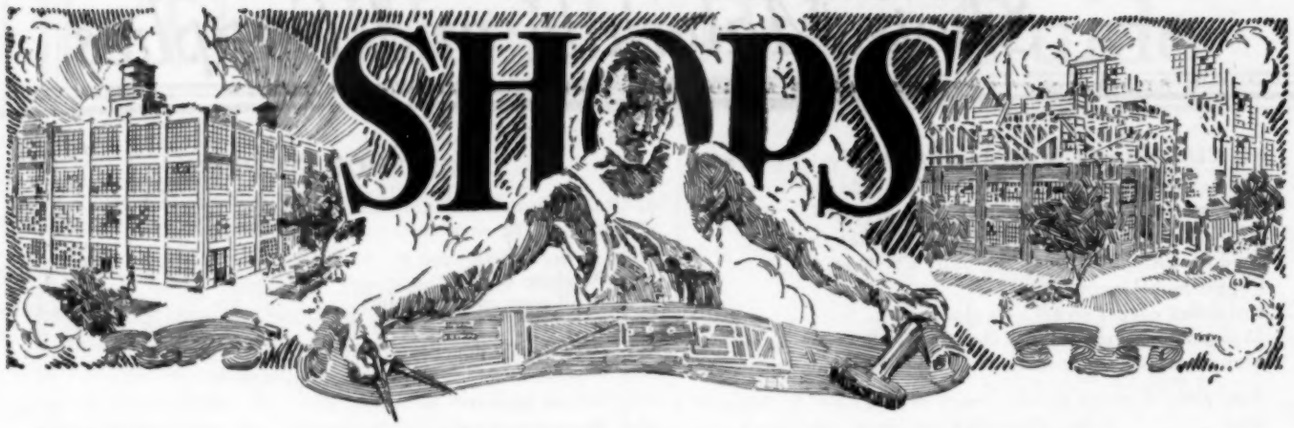
	New York	Cleveland	Chicago
Cotton waste, white, per lb	$0.07½@$0.10	$0.12	$0.13
Cotton waste, mixed, per lb	.05½@.09	.09	.11
Wiping cloths per M., 13¼x13¼	.....	50.00	55.00
Wiping cloths per M., 13¼x20½	.....	55.00	65.00
Sal soda, 100 lb. lots	2.80	2.50	2.65
Roll sulphur, 360 lb. bbl., per 100 lb	2.85	3.25	3.50
Linseed oil, per gal., 5 bbl. lots	.87	.99	.91
White lead, dry or in oil	100 lb. kegs.	New York, 12.25	
Red lead, dry	100 lb. kegs.	New York, 12.25	
Red lead, in oil	100 lb. kegs.	New York, 13.75	
Fire clay, per 75 lb. bag		.80	1.00
Coke, prompt furnace, Connellsville	per net ton		$3.00
Coke, prompt foundry, Connellsville	per net ton		3.75@4.25

SHOP SUPPLIES

Current Discounts from Standard Lists

	New York	Cleveland	Chicago
Machine Bolts:			
All sizes up to 1x30 in.	60-5%	60-10%	60-10-10%
1½ and 1¼x3 in. up to 12 in.	50%	60-10-10%	60-10%
With cold punched sq. nuts	50%	.....	.....
With hot pressed hex. nuts up to 1x30 in. (plus std. extra of 10%)	55%	.....	$4.00 off
Button head bolts, with hex. nuts	35%	$3.90 net	.....
Hex. head and hex. nut bolts	40%	.....	65-5%
Lag screws, coach screws	65%	.....	60%
Square and hex., head cap screws	75—10%	.....	.....
Carriage bolts, up to 1 in. x 30 in.	50-10%	60-10%	50-5%
Bolt ends, with hot pressed nuts	60%	.....	55%
Tap bolts, hex. heads	25%	.....	.....
Semi-finished nuts ⅝ and larger	75%	75-10%	80%
Case-hardened nuts	65%	.....	.....
Washers, cast iron, ½ in., per 100 lb. (net)	$4.50	$3.50	$3.50
Washers, cast iron, ⅜ in. per 100 lb. (net)	3.75	3.50	3.50
Washers, round plate, per 100 lb. Off list	4.00	.....	3.50 net
Nuts, hot pressed, sq., per 100 lb. Off list	3.00	3.50	4.00
Nuts, hot pressed, hex., per 100 lb. Off list	3.00	3.50	4.00
Nuts, cold punched, sq., per 100 lb. Off list	3.00	3.50	4.00
Nuts, cold punched, hex., per 100 lb. Off list	3.00	3.50	4.00
Rivets:			
Rivets, 7/16 in. dia. and smaller	60-5%	60-10-10%	65-5%
Rivets, tinned	60-5%	60-10-10%	4½c. net
Button heads ⅝-in., ¾-in., 1x2 in. to 5 in., per 100 lb (net)	$3.50	$3.25	$3.43
Cone heads, ditto (net)	3.60	3.35	3.53
1⅛ to 1¾-in. long, all diameters, *EXTRA* per 100 lb	0.25	.....	0.15
⅝ in. diameter *EXTRA*	0.15	.....	0.15
½ in. diameter *EXTRA*	0.50	.....	0.50
1 in. long, and shorter *EXTRA*	0.50	.....	0.50
Longer than 5 in. *EXTRA*	0.25	.....	0.25
Less than 200 lb *EXTRA*	0.50	.....	0.50
Countersunk heads *EXTRA*	0.35	.....	$4.03 base
Copper rivets	60-5%	50%	50-10%
Copper burs	40%	50%	.....
Lard cutting oil (50 gal. bbl.) per gal.	$0.65	$0.50	$0.55
Machine oil, lubricating, (50 gal. bbl.) per gal.	0.45	0.35	0.40
Belting—Present discounts from list in fair quantities (½ doz. rolls)			
Leather:			
Light grade	50%	50-5%	60-10%
Medium grade	40-5%	40-10-2½%	50%
Heavy grade	35%	40%	40-5%
Rubber and duck:			
First grade	50-10%	50-10%	.....
Second grade	60-10%	60-5%	60-5%
Abrasive materials—In sheets 9x11 in.:			
No. 1 grade, per ream of 480 sheets, Flint paper	$5.84	$3.85	$6.48
Emery paper	8.80	11.00	8.80
Emery cloth	27.84	32.75	29.48
Flint cloth, regular weight, width 3½ in., No. 1 grade, per 50 yd. roll,	4.50	.....	4.95
Emery discs, 6 in. dia., No. 1 grade, per 100.			
Paper	1.32	.....	1.49
Cloth	3.02	.....	3.20

NEW and ENLARGED



Machine Tools and Machinery Wanted

Machine-tool wants published without charge

Conn., Bridgeport—Botwink Bros., 28-42 Drouve St.—crank shaft, grinders, sandblast machines, air compressors, and power squaring shears up to 121 in. for ⅜ metal.

Conn., Bridgeport—M. J. Dowling & Co., 586 Gurdon St., C. W. Beeman, Purch. Agt.—one small drill press, and one 13 in. x 6 ft. Hendey lathe.

Conn., Bridgeport — The Miller Motor Sales Co., Evergreen St.—one Arbor press for truck repair use.

Conn., Bridgeport—J. H. Southey, 576 Gurdon St.—cloth cutting machine.

Conn., Middletown—The Frissell Fabrics Co., 363 Main St.—one 400 lb. Klauder-Weldon cotton yarn dyeing machine.

Col., Hugo—The Lincoln County Democrat—cylinder press.

Fla., Live Oak—The Liveoak Perry & Gulf R.R.—one 40 in. or 42 in. vertical boring machine.

Fla., Tampa—The Frigid Mfg. Co., A. N. Duncan, Pres.—equipment and machinery for ice machine manufacturing plant at Clear Water.

Ia., Ottumwa—F. O. Parks Scale Co.—one round stencil machine, ¾ letters; one cabinet japanning gas oven; one pedestal grinder and buffer.

Ill., Chicago—The Chicago Roller Skate Co., 4458 West Lake St.—one No. 3 and one No. 4 new style consolidated punch presses.

Ill., Chicago—The International Harvester Co., 606 South Michigan Blvd.—one oil separator, belt drive, preferably with crane, 2,500 cu. in. capacity, (used).

Ill., Chicago — A. Olsen, 216 North Lamon Ave.—lathe, drill press, air compressor, grinder and one 3 or 5 hp. ac. motor with shaft and pulleys.

Ill., Chicago—The Production Tool & Eng., Co., 507 West Jackson Blvd., G. Landsiedel, Purch. Agt.—one Wells tool and cutter grinder No. 190.

Ill., Freeport—The Arcade Mfg. Co., 1 Columbus Ave., B. C. Trueblood, Purch. Agt.—special machinery for the manufacture of hardware specialties.

Ill., Rockford—K. Anderson, c/o J. Tureson, 1409 7th St.—sheet metal working machinery.

Ill., Waukegan—Wayvell Chappell & Co.—one 22 in. back geared drill press.

Ky., Covington — The Lubricating Specialties Co., 16th and Water Sts.—one No. 5 Toledo punch press or equal.

La., Alexandria—J. B. Hubble, 10th and Hakengas Sts.—equipment and machinery for creamery now in course of construction.

La., Gibsland—Reed Bros. Garage—complete machinery and equipment for automobile repair work.

Mich., Detroit — J. C. Burkin, 1265 Alexandrine Ave.—two floor standing machines (Sleughter machines preferred).

Mich., Detroit—The Cadillac Mchy. Co., Boydell Bldg., Beaubien and East Lafayette Sts.—one 59½ Toledo or 80½ Bliss press, or their equivalent, (used).

Mich., Detroit—C. W. Heier, 2393 Carson Ave.—blacksmith's drill press and miscellaneous tools; power cement block machines; concrete mixer.

Mich., Detroit—H. A. Meier, 2153 Bellevue Ave.—one 6 x 8 planer, 42 in. x 14 ft. bed; electric hoist; 3 ton air compressor; 3 ton crane, 35 ft. span.

Mich., Detroit—The Mills Baking Co., 5165 4th Ave.—miscellaneous bakery equipment for proposed addition.

Mich., Detroit — The Motschall Co., Canton Ave. and Blvd. (printers)—cylinder press 25 x 38 in. or larger.

Mich., Detroit—C. G. Push, 4730 Tireman Ave.—small wood turning lathe, power driven for about ¼ hp. motor, also small jig or band saw (used).

Mich., Detroit — P. Smith Grocery Co., Smith Bldg., Griswold and State Sts., W. W. Henderson, Purch. Agt.—cake mixers and miscellaneous equipment. Blodgett oven.

Mich., Detroit—The Warwich Stamping Co., Miller Rd. and Thayer Ave.—miscellaneous equipment for making metal stampings, power driven.

Mo., Joplin—The Auto Repair Co., 607 Bway., C. P. Cleaver, Purch. Agt.—drill press, lathe, belting and shafting for machine shop and garage.

Mo., Joplin — The Fifth Street Garage, 211 West 5th St., C. W. Helm, Purch. Agt. medium size lathe, belt, shafting and electric motor.

Mo., Joplin—H. H. Green, 1615 Main St.—shafting, hangers and bearings.

Mo., Joplin—The Miners Ice & Fuel Co., 318 Main St., J. E. Cambell, Purch. Agt.—belting, shafting, hangers and pulleys.

Mo., Joplin—Nutz Bros., 1301 Joplin St., R. Nutz, Purch. Agt.—electric drill press and lathe for garage and machine shop.

Mo., Joplin—P. F. Parrott, 1720 Main St.—woodworking machinery and machine to make broom handles.

Mo., Joplin—The Purity Ice Cream Co., Bway. and Cox St., C. L. Clark, Purch. Agt.—ice crushers, belting, motors and shafting for ice cream factory.

Mo., Joplin—The Texas Oil Co., East 5th St., C. J. Warden, Purch. Agt.—oil filtering equipment for new station on 5th and Wall Sts.

Mo., Joplin—A. P. Townsend, 913 Main St. (shoemaker)—leather working machinery, shafting, hangers and bearings.

Mich., Munising — Logan & Blom, F. Logan, Purch. Agt.—steam driven laundry machinery.

Mo., Nevada—I. H. Dowell—oil drill for drilling oil wells.

Minn., Wolverton — Hendrickson Bros. will be in the market about April 1 for gravel handling equipment including gasoline cranes, conveyors, bins.

N. Y., Buffalo—Behringer Bros., Inc., 171 Imson St.—four head outside molder.

N. Y., Buffalo—G. F. Hausner, 939 Northampton Sts.—sheet metal machines.

N. Y., Gouverneur—Rich & Lalonde, J. H. Lalonde, Purch. Agt.—drill press, small miller and used shafting.

N. Y., Potsdam—Elliott & Sons Co.—machinery and equipment for the manufacture of hardwood mangle rollers.

N. Y., Richmond Hill—J. Kraus, 440 129th St.—Carver steel die stamping press, size 4 x 8 or larger.

N. Y., Tonawanda—The Buffalo Bolt Co., D. F. Cullinan, Purch. Agt.—one or more No. 60 Waterbury roll threaders, (used).

N. Y., Watertown—E. C. Hodge, Route 5,—saw mill equipment.

N. C., Hickory—The Southern Toy Co., G. F. Ivey, Pres.—one swing cut off saw, short stock; one combined scroll and resaw, 4 in. blades; one glue jointer; one double cut off saw; one single end tenoner; one 4 side, 4 or 6 in. moulder; one vertical boring machine, 6 spindle; one chuck machine for round tenonts; one 50 hp. high speed engine; 100 ft. 1 7/16 in. shafting with couplings and post hangers; one double spindle shaper; dry kiln equipment; 20 factory trucks; one fan and dust collecting system (used).

N. C., Lansing—The Lansing Lumber Co., V. E. Ballou, Mgr.—door and sash machine; flooring machine; end matcher; tenoning machine; moulder; resaw; jointer and sander (used).

N. C., Rose Hill—The Atlantic Coffin & Casket Co., E. McN. Carr, Pres.—one 40 in. high speed fan; one double spindle shaper 1½ in.; one scroll or band saw, 36 in.; one 12 in. moulder; combination saw table; tilting arbor; rip saw; three drum sander; jig or scroll saw; 6 in. hog; swing cut off saw cabinet planer, 30 or 36 in. wide; 36 lumber trucks for use in plant.

N. C., Salisburg — The Arey Brick & Lumber Co., N. G. Arey, Mgr.—band resaw and gang saw (new or used).

N. C., Statesville—J. C. Steele & Sons, C. M. Steele, Purch. Agt., manufacturers of brick making and clay working machinery—one 30 to 36 in. vertical boring mill, preferably two heads, or 30 in. modern lathe, short bed; Baker Bros. keyseater, to cut to 1½ in. key ways; bolt threading machine to cut ¼ in. to 2 in. threads; 30 in. side planer with short bed. Must be modern (used).

N. C., Wilmington—The Carter's Production Wks., 210 South Water St., O. Carter Purch. Agt.—single phase, 60 cycle, 110 volt, electric buffing machine, prefer double ended buffer with wheels complete (new or used).

O., Cincinnati—The Clifton-Pratt Co., 1224 West 8th St., A. E. Clifton, Purch. Agt.—electric welding outfit for general repair work on automobile frames, fenders, etc., Lincoln or similar make.

O., Cincinnati—The Eastern Mchy. Co., 408 East Pearl St., A. Smith Purch. Agt.—20 in. drill presses; 12 or 14 in. swing lathes 6-8 beds; power presses, No. 18, 19, 20 or 21 Bliss.

O., Cincinnati—The Fair Mchy. Co., 217 Walnut St., M. G. Overend, Purch. Agt.—12 x 12 in. power hack saw and 12 in. hand jointer.

O., Cincinnati—The Jones Machine Tool Co., 435 East Pearl St., A. Jones, Purch. Agt.—lathe with 60-72 in. swing and 18 ft. bed; No. 23 New Britain automatic screw machine.

O., Cincinnati—The E. A. Kinsey Co., 335 West 4th St.—wire crimping or forming machine to be used for interlocking notched wires for cylindrical screens.

O., Cleveland—The Bd. Educ., Rockwell Ave. and East 6th St., S. Hyre, clk.—two 12 in. woodworking speed lathes, 55 in. bed; 220 v. d.c. motor, head stock, variable speed, 600 to 3,000 r.p.m., American or equal; one 20 in. pattern maker's lathe, belt driven, with 2 hp. dc. motor.

O., Cleveland—The city, A. B. Roberts, dir. Public Utilities, City Hall—one locomotive crane for use in city water department.

O., Columbus—The Dept. of Public Welfare, Oak and 9th Sts.—new machinery, including crusher, drying pan, 6 kilns, etc., for brick plant at Junction City.

O., Cleveland — W. Eppler, 3305 West 25th St.—bench lathe.

O., Cleveland—The New York, Chicago & St. Louis R.R. Co., Columbia Bldg., W. P. Dittoe, Purch. Agt.—air compressor, bolt cutter, wheel press, also used miscellaneous shop equipment.

O., Cleveland—The Northern Blower Co., West 65th St. and Barberton Ave.—one punch and shear, ½ by 1½ capacity; one 10 ft. brake 12 gauge capacity; one 10 ft. squaring shears, 12 gauge capacity.

O., Cleveland—The Sterling Brass Co., 4610 St. Clair Ave., S. L. Weil, Genl. Mgr. —Mono rail conveyor system, brass furnace, blowers, lathes for new brass foundry and machine shop.

O., Columbus — The Non-Liquid Door Check Co., Comstock Bldg., E. D. Taylor, Genl. Mgr.— will soon be in market for punch presses and milling machines.

O., Elyria—The Ridge Tool Machine Co., W. Thews, Purch. Agt.—machine tools.

O., Fostoria—L. H. McNeil—hand press, and cutting off machine for bench.

O., Toledo — J. Meyers, 1958 Glendal Ave.—four linotype machines.

Ore., Portland—R. A. Wurzburg, Pres. Columbia Tire Corp., Northwest Bank Bldg.—$170,000 worth of machinery and miscellaneous equipment for tire factory on Columbia Blvd.

Pa., Chester—The Irving Worsted Co.—looms, spindles, etc., for new factory.

Pa., Johnstown—The Lorain Steel Co.—one 10 ton and two 5 ton cranes, mill type.

Pa., Media — Delaware County Prison, c/o E. M. Harvey—receiving bids until March 7 for one washing machine, one extractor, one soap tank and one sterilizer, installed complete.

Pa., Phila.—A. Ayres, 921 Sansom St.—one band saw, (used).

Pa., Phila.—J. Blood & Co., 7th and Somerset Sts.—knitting machines, automatic operation.

Pa., Phila. — The Elgin Tool Machine Wks., 233 North 4th St.—one 9 or 10 in. screw cutting lathe with hollow spindle.

Pa., Phila.—The Ferris Shoe Co., 6th St. and Duncannon Ave.—machinery for new shoe factory.

Pa., Phila.—The Frankford Paper Box Mfg. Co., 2951 North Marshall St., J. E. Linck, Treas.—machinery for the manufacture of boxes, including presses, cutters, dies, etc.

Pa., Phila.—The Gotham Silk Hosiery Co., 2nd and Norris Sts.—automatic machines for knitting mill and lathe, drill press, etc., for use in machine shop.

Pa., Phila.—F. E. Griffiths Co., 2615 West Hagerts St., F. E. Griffiths, Purch. Agt.—additional machine tools and machinery for the manufacture of meters, etc.

Pa., Phila.—The Leonard Knitting Mills, Inc., A. H. Weiswasser, 5417 Webster St., Pres.—machinery for knitting mills.

Pa., Phila.—The Lewis Textile Co., Frankford and Lehigh Aves., W. J. Steen, Pres.—looms and equipment for textile mills.

Pa., Phila.—The Liberty Knitting Mills, 1029 Race St.—additional machines.

Pa., Phila.—The Meyer Specialty Co., 1800 North 5th St.—one lock corner machine.

Pa., Phila.—H. T. Paiste & Co., 32nd and Cherry Sts. (electrical supplies)—power hack saws, lathes, drill presses and other metal working machinery for new factory.

Pa., Phila.—Pierce-Butler & Pierce Mfg. Corp., Broad and Race Sts., manufacturers of boilers, radiators, etc.—machinery for new factory on Glenwood Ave. along the tracks of the Pennsylvania R.R., including lathes, drill presses, riveting hammers, grinders, etc.

Pa., Phila. — The Precision Brass & Bronze Fdry., T. E. Montgomery, 1001 Chestnut St., Treas. — machinery for foundry and machine shop.

Pa., Phila.—The Reyburn Mfg. Co., 32nd St. and Allegheny Ave.—milling machine and other equipment.

Pa., Phila.—The Rockland Hosiery Mills, Allegheny and Kensington Aves., M. Sarfert, Pres.—additional knitting machine.

Pa., Phila.—Segal & Rothman, 144 North 3rd St.—screw cutting lathe, 4 ft. x 10 in.

Pa., Phila.—Sheplan, Sabol & Palmer, 15th and Wallace Sts.—carders, looms and knitting machinery for new factory.

Pa., Phila. — Supplee-Wills-Jones, 3339 Ludlow St.—ice and ice cream manufacturing machines for new factory.

Pa., Phila.—G. L. Tallman, 28 South Farragut St.—weaving mechanism parts.

Pa., Phila.,—M. H. Walwrath Co., Park and Glenside Aves.—additional workworking machinery.

Pa., Phila.—The Wicado Screw & Machine Wks. Co., 4801 Stenton Ave.—one Brown & Sharpe grinding machine No. 10 or 11.

Pa., Pittsburgh—Riter-Conley Co., Oliver Bldg.—one 10 ton, two 7½ ton and three 3 ton, 2 trolley cranes for plant at Lutsdale.

S. C., Chester—R. C. Guy—creosoting machinery and outfit.

S. C., Conway—The Veneer Mfg. Co., W. A. Stilley, Mgr.—lathe, engine to swing 20 to 24 pulley and take in shaft 8 ft. long (used).

Tex., Austin — W. Tips Co., 708-12 Congress Ave.—power threading machine for cutting threads on bolts.

Va., Lynchburg—The Thornhill Wagon Co., E. Thornhill, Mgr.—vehicle wood rim bending outfit; vertical drilling and reaming machine to bore and ream cast iron cylinders from 2¼ in. diameter by 8 in. long to 3¼ in. diameter by 11 in. long.

Va., Norfolk—The Harrisonburg Poultry & Egg Co., 21 Madison St., R. Richter, Mgr.—modern dairy machinery including pasteurizing equipment for new plant on 12th St. and Monticello Ave.

Va., Winchester—The Winchester Lumber Corp., W. B. Cornwell, Pres. and Genl. Mgr.—dry kiln and complete woodworking machinery outfit for manufacturing flooring (used).

W. Va., Parkersburg—The Parkersburg Rig & Reel Co.—boring mill, radial drill and lathe.

Wis., Appleton—J. Belzer, 776 Lawe St.—machinery and equipment for garage and repair shop.

Wis., Jim Falls—The Jim Falls Co-op. Creamery, c/o T. Saltsgarber—dairy machinery, churns, vats, etc.

Wis., Merrill—The Merrill Buick Co.—presses, 1 and 2 ton, also auto repair equipment.

Wis., Merrill—The Spring Brook Co-op. Dairy Co., c/o G. Karan, Route 6—creamery and cooling machinery.

Wis., Milwaukee—Cappon & Resech, 1348 Booth St.—drill press and lathe suitable for garage duty.

Wis., Milwaukee—The Milwaukee-Western Fuel Co., 120 Wisconsin St., E. A. Uhrig, Purch. Agt.—coal crane and conveying machinery.

Wis., Milwaukee—The West Side Express Co., 2319 Lisbon Ave.—lathe for garage repair work.

Wis., Milwaukee—The Wisconsin Public Service Corp., 559 Marshall St., C. C. Smith, Purch. Agt.—oil gas machine, purifiers and gas compressor for gas plant at Green Bay.

Wis., Minocqua—The Minocqua Heights Hotel So., c/o H. T. Ames—machinery for auto repairing.

Wis., Racine—M. J. Shaw, Inc., 17th and Hamilton Sts.—machinery for the manufacture of shoes, including stichers, eye-let, vamping and lasting machines.

Wis., Sheboygan—The Sheboygan Gas Co., 618 North 8th St.—special machinery and equipment for proposed gas plant.

Ont., Montreal — The Lymburner Brass Wks., Inc., 1025 Boyer St.—complete equipment for brass foundry.

Ont., Montreal—H. H. Robine, 778 St. Catharine St., W.—small lathe and tools (varied) for garage and repair shop.

Metal Working Shops

Conn., East Hartford (Hartford, P. O.)—H. E. Bidwell, 209 State St., has awarded the contract for the construction of a 1 story, 50 x 125 ft. garage sales and service building, with 15 x 122 ft. ell, on Connecticut Blvd. Estimated cost, $40,000. Noted Jan. 12.

Conn., Hartford—The Bush Mfg. Co., Wellington Ave., will soon award the contract for the construction of a 1 story, 50 x 250 ft. manufacturing plant on Wellington Ave., for the manufacture of machinery. Estimated cost, $60,000. Buck & Sheldon, Inc., 60 Prospect St., Archts. and Engrs.

Conn., Hartford—The Hartford Electric Light Co., 266 Pearl St., has awarded the contract for the construction of a 1 and 2 story, 75 x 155 ft. battery charging building on Sheldon St.

Ill., Chicago—W. W. Ahlschlager, Archt., 65 East Huron St., is receiving bids for the construction of a 1 story, 150 x 214 ft. garage on Clark St. and Rogers Ave., for H. and W. Thompson, 4925 North Washtenaw Ave. Estimated cost, $50,000.

Ill., Chicago—A. S. Alschuler, Archt., 28 East Jackson Blvd., is receiving bids for the construction of a 3 story, 100 x 300 ft. office, sales and service building on 22nd St. and Michigan Ave., for the Hudson Motor Car Co., 25th St. and Michigan Ave. Estimated cost, $350,000.

Ill., Chicago—The Briskin Mfg. Co., 215 South Hoyne Ave., (sheet metal works), has awarded the contract for the construction of a 2 story, 50 x 127 ft. factory at 215-17 South Hoyne Ave. Estimated cost, $40,000.

Ill., Chicago—I. Engel, 3056 Palmer Sq., is receiving bids for the construction of a 1 story, 100 x 125 ft. garage and auto sales station on Milwaukee Ave. near Crawford St. Estimated cost, $40,000. Private plans.

Ill., Chicago—A. Mikell, 1311 Washburn Ave., is receiving bids for the construction of a 2 story, 72 x 107 ft. garage on Taylor and Garibaldi Sts. Estimated cost, $50,000. H. Dalsey, 2321 West North Ave., Archt.

Ill., Chicago—Ronneberg, Peirce & Hauber, Archts., 10 South La Salle St., are receiving bids for the construction of a 1 story, 75 x 96 ft. machine shop at 2704-10 West Lake St., for J. Nielsen, care of architects.

Ind., Evansville—J. H. Kreipke Co., 512 West Franklin St., plans to build a 3 story, 33 x 80 ft. warehouse and sheet iron work shop on West Franklin St. Estimated cost, $40,000. Architect not selected.

Mich., Detroit—The City Dept. of Motor Transportation, City Hall, is having plans prepared for the construction of a 1 story garage and service station on Jefferson Ave. Estimated cost, $560,000.

Mo., St. Louis—Bonsack & Pearce, Archts., Laclede Gas Bldg., will receive bids until March 4 for the construction of a 1 story, 75 x 95 ft. garage for D. F. McCabe, 6407 Ridge Ave. Estimated cost, $40,000. Noted Feb. 16.

Mo., St. Louis—Scruggs, Vandervoort & Barney Dry Goods Co., 10th and Olive Sts., has awarded the contract for the construction of a 4 story, 130 x 160 ft. garage on St. Charles St. Estimated cost, $350,000. M. L. Wilkinson, Pres. Noted Feb. 2.

N. C., Highland (Hickory, P. O.)—The Highland Cordage Co., c/o C. H. Geitner, Pres., will build a 1 story, 80 x 440 ft. yarn mill, here. Estimated cost, $50,000.

O., Cleveland—J. Cohen, 2376 East 49th St., has awarded the contract for the construction of a 1 story, 31 x 81 ft. garage at 2627 East 31st St. Estimated cost, $40,000.

O., Cleveland—The Sterling Brass Co., 4610 St. Clair Ave., has awarded the contract for the construction of a 1 and 2 story, 75 x 90 ft. brass foundry and machine shop on East 93rd St. and Catherine Ave. Estimated cost, $80,000. S. L. Weil, Mgr. Noted June 23.

Ore., Portland—R. A. Wurzburg, Pres. of the Columbia Tire Corp., Northwest Bank Bldg., is receiving bids for the construction of a 2 story, 80 x 350 ft. tire factory on Columbia Blvd. along the tracks of the Oregon Washington R.R. and Navigation Co. Estimated cost, $80,000.

Pa., Phila.—E. J. McAleer & Co., 1420 North 8th St., manufacturer of tin ware, has awarded the contract for the construc-

tion of a 5 story, 84 x 130 ft. factory and warehouse at 1422 North 8th St. Estimated cost, $65,000.

Pa., Phila.—A. W. Pusey, West End Trust Bldg., will soon receive bids for the construction of a 3 story, 35 x 160 ft. garage on Watts and Gerard Aves. Estimated cost, $50,000. N. Hulme, 1524 Chestnut St., Archt.

Pa., Phila.—C. Zeisloft, c/o A. C. Bofzner, Archt., 717 Walnut St., will soon receive bids for the construction of a 1 story, 110 x 116 ft. garage on Ridge Ave. and Lyceum St. Estimated cost, $60,000.

Wis., Merrill—The Merrill Buick Co. has purchased a site on Main St. and plans to build a 1 story, 57 x 125 ft. garage and repair shop. Estimated cost, $55,000. Architect not selected.

Wis., Milwaukee—The International Harvester Co., 217 Oregon St., has awarded the contract for the construction of a 1 story, 20 x 50 x 100 ft. garage on Reed St. Estimated cost, $40,000. Noted Jan. 26.

Wis., Milwaukee—A. Kaufman, 1325 Vliet St., will soon award the contract for the construction of a 1 and 2 story, 50 x 160 ft. garage on Walnut St. Estimated cost, $40,000. R. B. Williamson, Broadway Bldg., Archt. Noted Feb. 2.

Wis., Minocqua—The Minocqua Heights Hotel Co., c/o H. T. Ames, is having plans prepared for the construction of a 4 story, 75 x 250 ft. hotel and garage. Estimated cost, $150,000. A. H. Rantz, Minocqua, Archt.

Wis., Sheboygan—S. W. Miller Piano Co., 2020 North 15th St., is having plans prepared for the construction of a 1 story, 56 x 108 ft. piano factory on Niagara St. Estimated cost, $20,000. Noted Feb. 9.

Wis., South Milwaukee—The Bucyrus Co. will soon award the contract for the construction of a 1 story, 60 x 278 ft. foundry. F. D. Chase, Inc., 645 North Michigan Ave., Chicago, Archt. and Engr.

Wis., Spencer—The Spencer Condensory Co., c/o E. Buss, Marion, is having plans prepared for the construction of a 2 story, 50 x 94 ft. condensory. Estimated cost, $40,000. G. Krasin, Marshfield, Archt. Noted Jan. 19.

General Manufacturing

Cal., Burbank—A. Jergens Co. has awarded the contract for the construction of a 2 story, 51 x 70 ft. soap factory. Estimated cost, $17,500.

Cal., Napa—The Union Ice Co. has awarded the contract for the construction of an ice plant. Estimated cost, including equipment $50,000.

Conn., Allingtown (New Haven, P. O.)—D. E. Smith, Archt., 152 Temple St., New Haven, is receiving bids for the construction of a 1 story, 156 x 201 ft. textile plant and a 1 story, 40 x 50 ft. boiler house and garage, for the Velvet Textile Corp., P. O. Box 1962, New Haven. Estimated cost, $100,000.

Conn., Thompsonville—The Bigelow, Hartford Carpet Co., 58 Main St., will build a 1 story, 85 x 115 ft. addition to its brussel mill. Estimated cost, $40,000.

Conn., Waterbury—The Natl. Biscuit Co., 22 Spring St., has awarded the contract for the construction of a 2 story 60 x 120 ft. biscuit plant on North Liberty St. Estimated cost, $40,000. Noted Feb. 9.

D. C., Washington—The Amer. Dairy Supply Co., 318 Maine Ave., S.W., has awarded the contract for the construction of a factory. Estimated cost, $40,000.

Ill., Beardstown—The Gorman Ice & Coal Co. has awarded the contract for the construction of a 1 story, 30 x 42 ft. ice plant. Estimated cost, $25,000. Noted Feb. 16.

Ill., Chicago—J. Peterson, c/o H. I. Dalsey, Archt., 2321 West North Ave., has awarded the contract for the construction of a 1 story, 25 x 125 ft. cabinet factory at 2447 North Crawford Ave. Estimated cost, $17,000.

Ill., Chicago—Marshall & Fox, Archts., 721 North Michigan Blvd., are receiving bids for the construction of a 7 story, 118 x 125 ft. office and printing plant on Ontario and St. Clair Sts., for the Popular Mechanics Magazine, 6 North Michigan Blvd. Estimated cost, $40,000.

Ind., Ft. Wayne—Goodman & Co., Bayer Bldg., plans to build a 2 story, 100 x 200 ft. hosiery factory. J. A. Goodman, Pres. Estimated cost, $50,000. Architect not selected.

Ind., Huntington—The Huntington Ice Co., Inc., plans to build a 2 story ice plant. Estimated cost, $40,000. Architect not selected.

Kan., Hutchinson—The Carey Fibre Products Co., manufacturer of fibre wall board, plans to build a 2 story factory to replace the one destroyed by fire. Estimated cost, $35,000. Architect not selected.

Mich., Detroit—The Mills Baking Co., 5165 4th Ave., is having plans prepared for the construction of a 2 story addition to its bakery plant. Estimated cost, $40,000. Smith, Hinchman & Grylls, 710 Washington Arcade, Archts.

Mo., Columbia—The Columbia Bottle Wks., c/o R. Cassidy, is having plans prepared for the construction of a 1 story, 70 x 135 ft. bottling plant. Estimated cost, $35,000. Private plans.

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0207

Mo., Hannibal—The Bluff City Shoe Co. plans to build a 2 story addition to its shoe factory at 1201 Collier St. Estimated cost, $25,000. J. W. Logan, Secy. Private plans.

Mo., Hannibal—The Robinson Bros. Paint Co., 201 South 5th St., plans to build a 1 story warehouse and paint factory. Estimated cost, $40,000. Architect not selected.

Mo., Jefferson City—The Standard Crate & Filler Co., has awarded the contract for the construction of a 2 story, 100 x 220 ft. egg crate and straw board manufacturing plant. Estimated cost, $200,000. W. F. Winkleman, Treas. Noted Feb. 16.

Minn., Minneapolis—The City Dye House, Inc., 2637 Nicollet Ave., is having plans prepared for the construction of a 2 story, 130 x 132 ft. laundry on Nicollet Ave. and 29th St. M. Eisenstadt, Pres. Estimated cost, $75,000. P. E. Crosier, 915 N. Y. Life Bldg., Archt.

N. J., Beverly—J. A. Bidwell Co., 413 R.R. Ave., manufacturer of cotton specialties, plans to build a 2 story, 40 x 100 ft. addition to its factory. J. A. Bidwell, pres.

N. C. Kingston—H. C. Hines is having plans prepared for the construction of a 2 story, 30 x 100 ft. ice cream factory. Estimated cost, $50,000. K. W. Schantz, care of owner, Engr.

O., Cleveland—J. McKay, 1285 East Blvd., has awarded the contract for the construction of a 1 and 2 story, 30 x 90 ft. printing plant at 1449 Lakeside Ave. Estimated cost, $40,000.

O., Cleveland—The Thayer-Norton Co., 3136 West 63rd St., (meat packers), plans to build a 3 story addition to its beef plant on West 65th St. along tracks of the Cleveland, Cincinnati, Chicago & St. Louis R.R. Estimated cost, $100,000. Anders & Reimers, Erie Bldg., Archts.

O., Zanesville—The Pure Ice Co., Underwood St., is having plans prepared for the construction of a 1 story, 50 x 50 ft. ice plant. Estimated cost, $50,000. A. C. Bishop & Co., 427 Guardian Bldg., Cleveland, Archts. and Engrs.

Pa., Erie—The Mutual Ice Co. is having plans prepared for the construction of a 1 story ice plant. Estimated cost, $60,000. A. C. Bishop & Co., 426 Guardian Bldg., Cleveland, Archts. and Engrs.

Pa., Phila.—J. Blood & Co., has awarded the contract for the construction of a 2 story, 60 x 79 ft. hosiery mill on 7th and Norris Sts. Estimated cost, $35,000.

Pa., Phila.—The Gotham Silk Hosiery Co., 2nd and Norris Sts., has awarded the contract for the construction of a 10 story, 56 x 122 ft. and 20 x 20 ft. hosiery factory on 2nd and Norris Sts. Estimated cost, $500,000.

R. I., Providence—The Crompton & Knowles Loom Wks., 241 Harris Ave., has awarded the contract for the construction of an addition.

Va., Winchester—The American Gas Improvement Co., 2 Rector St., New York, plans to purchase the interests of the Winchester Gas Co., here, and is having plans prepared for the construction of an addition to gas plant, etc. Estimated cost, $150,000. D. B. Steinman, 25 Church St., New York, Engr.

W. Va., Belle—The Belle Alkali Co. plans to build 2 additions, one for the manufacture of caustic soda and the other for the manufacture of chlorine. Private plans.

Wis., Hartford—The Gehl Bros. Monument Co. has awarded the contract for the construction of a 2 story, 42 x 106 ft. marble factory. Estimated cost, $65,000. Noted Jan. 19.

Wis., Jim Falls—The Jim Falls Co-op. Creamery, c/o T. Saltsgarber, plans to build a 1 story, 50 x 170 ft. creamery. Estimated cost, $50,000. Architect not selected.

Wis., Manitowoc—E. Phillips & Sons, 8th and Quay Sts., have purchased a site on 8th St. and plan to build a candy factory. Architect not selected.

Wis., Milwaukee—The Mi Lola Cigar Co., 139 Sycamore St., has awarded the contract for the construction of a 1 story, 60 x 300 ft. cigar factory and a 2 story, 42 x 60 ft. office on Green Bay Road.

Wis., Milwaukee—The Phoenix Knitting Co., 208 Bway., has awarded the contract for the construction of an 8 story, 120 x 180 ft. dye house and finishing plant on Milwaukee and Buffalo Sts. Estimated cost, $500,000. Noted Feb. 2.

Wis., Sheboygan—The Sheboygan Gas Co., 618 North 8th St., is having plans prepared for the construction of a 1 story, 42 x 146 ft. gas plant. Estimated cost, $60,000. E. A. Stubenrouch, 629 North 8th St., Archt.

Wis., Spencer—The Spencer Condensory Co. is receiving bids for the construction of a 2 story, 50 x 94 ft. condensory. Estimated cost, $50,000. G. A. Krasin, Marshfield, Archt.

Wis., Stevens Point—The Pfiffner Lumber Co., 229 Franklin St., is having plans prepared for the construction of a 2 story, 60 x 100 ft. planing mill. Estimated cost, $25,000. F. Spalenka, Stevens Point, Archt.

Ont., Oil City—The Canadian Oil Companies, Ltd., plans to install an oil filtering plant. Estimated cost, $25,000. Private plans.